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ABSTRACT

As one in a series of test item collections developed by the Assessment and Evaluation Unit of the Directorate of Studies, items are made available to teachers for the construction of unit tests or term examinations or as a basis for class discussion. Each collection was reviewed for content validity and reliability. The test items meet syllabus content and aims best suited to multiple choice questions, but teachers are meant to base the use of the test items on student ability and the particular program objectives in grades 7 through 10. The first of two volumes of test items in physics contains sections on measurement and scales, simple machines, properties of matter and energy. Items concerning electromagnetic radiation, heat, light, optics and sound are included. Communications and meteorology sections complete the volume. There are 258 test items. Answers are provided with each item and drawings illustrate many questions. (CM)

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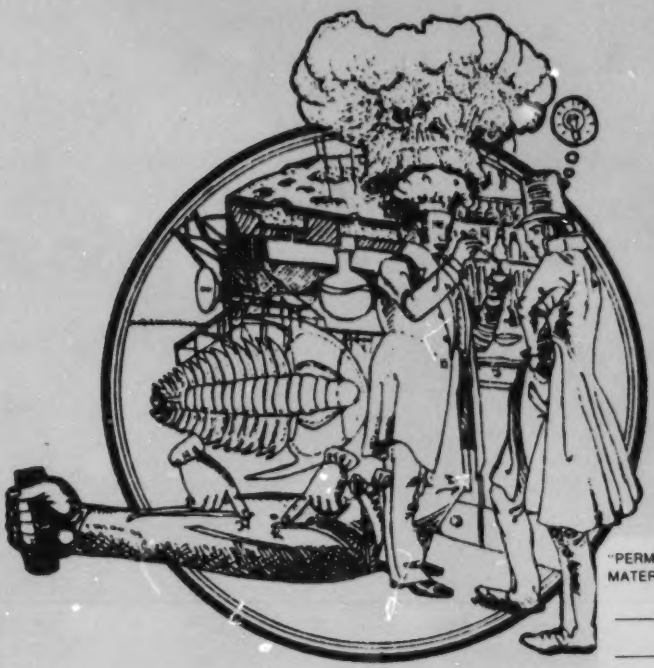
SCIENCE



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A COLLECTION OF MULTIPLE CHOICE TEST ITEMS RELATING MAINLY TO

PHYSICS - 1

TM 820 319

VOLUME TWENTY OF THE SCIENCE LIBRARY OF TEST ITEMS

ISBN - 0 - 7240 - 5845 - 1

VOLUME TWENTY OF THE
SCIENCE LIBRARY OF TEST ITEMS

PHYSICS - 1

Also in this series.....

Volume 17	BIOLOGY
Volume 18	CHEMISTRY
Volume 19	GEOLOGY
Volume 21	PHYSICS (2)
Volume 22	SKILLS

Produced by the
School Certificate Development Unit
Directorate of Studies
Department of Education
New South Wales
1981

Introduction

This is the fourth volume of multiple choice test items in the six volume series issued in 1981 for the Science Library of test items.

This volume (and the fifth) contain test items which relate mainly to Physics. As such, they contain all the physics items from the old volumes 1 and 2, and all new items to date.

As with all volumes in the collection, this does not follow or interd to follow any particular syllabus and should not be taken as dictating content or teaching programs. It is simply a collection of items written towards some particular physics content areas which may or may not be taught in your school.

When setting tests remember to use other types of items - short answer extended response or essay etc. - and supplement these items with some of your own. In this way only, will you achieve a test with the desired emphasis on your particular teaching objectives.

We know there are gaps in the collection, but we don't know everything, so please write and tell us how you use the collection, what you think of it, what additions you would like to see in it.

Address all correspondence to

The Subject Officer, (Science)
School Certificate Development Unit.
Box 460 P.O.
NORTH SYDNEY N.S.W. 2060

Acknowledgements

Many teachers have been involved in developing the library of test items. As with any list of credits, there will always be some who are inadvertently overlooked. To these we extend our apologies.

Those who appear in our files, in alphabetical order, appear in the list below. To these, our thanks and appreciation for work done and the hope that we will continue to receive your support in the future:

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And a special thanks to the girls at S.C.D.U. who have typed without (audible) complaint as we have constantly changed question after question.

JAN ANGLIM
ALISON ADLARD
SHARON WEBB
WENDY HOME

Editorial and Review Committee

Mary BLACKBURN
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DEVELOPMENT OF THE LIBRARY

This collection of material is intended as a resource to assist teachers to implement and evaluate courses in the first four years of secondary school.

Because the questions were submitted by classroom teachers from both Government and non-Government schools in all parts of the State, they constitute a cross-section of the ideas which currently pervade classroom practice.

To ensure quality in the collection, only those items which satisfied several quality control checks have been included. Foremost among these were:

(i) inspection by a panel of experienced, practising teachers;

(ii) a pretest with a representative selection of Years 7-10 students.

As well as sharing in the general editing and reviewing functions, the review panels checked each item for *content validity*. The pretest was used to establish the *efficiency* of the items as measuring instruments. Three of the major statistical criteria used were:

(i) Item Facility: The facility index measures the proportion of the sample candidature who answered the question correctly. All items in this collection have a facility index between 0.30 and 0.90.

(ii) Item Discrimination: This index measures the degree to which success on the item is correlated with success on the total test of which the item is a part. A commonly used index of discrimination is the point-biserial correlation coefficient. Every item in this collection attained a point-biserial correlation coefficient of at least 0.20. This means that on the pretest, each item added significantly to the total score of information about the relative achievement of the candidature.

(iii) Distractor Efficiency: With each item, each distractor was chosen by at least 5% of the total candidature, except in the case of very easy items, where an even spread of respondents was sought.

For the test to be reliable, many features apart from these three must be considered. However, the proven quality of these items, as measured by these three criteria, makes it highly likely that any test chosen from this collection, and administered to *appropriate* classes, will be a more reliable instrument than teachers could normally produce without this assistance.

USING THE COLLECTION

Items in this collection may be reproduced for classroom use in any form desired by the teacher. To facilitate the preparation of printing masters particular attention has been given to both the diagrams and the layout of the items.

To assist the teacher, the items have been classified according to the content being tested and two pieces of information are provided:

(i) the key (or correct option), and;

(ii) the difficulty rating (1-5), which is based on the data obtained during the pre-testing program. A question rated "1" was correctly answered by some 30-40% of students, while "5" indicates a correct response by 80-90% of students in the pre-test sample. Recent investigations have shown that while this information is useful as a general guide, item difficulties vary greatly when items are given to classes who have recently studied the material covered in given items. The ratings should not be confused with norms or goals: they are merely useful guidelines for teachers.

It is suggested that items might be used for the following purposes:

1. As a source of items for short unit tests.
2. As a source of items for term tests.
3. As a source of ideas for in-school item construction.
4. As a basis for class discussions (it should be noted that stimulus material was NOT designed for use with the overhead projector. The letter size used in typing items would not be legible at more than 4 metres from the screen in an average classroom).

One important warning should be given to all teachers using this collection. Some areas of syllabus content and some syllabus aims are better suited to testing with multiple choice items than others. Consequently, this collection is unlikely to be balanced in its coverage. In addition, the inclusion of an item is not intended to imply that a particular piece of content or teaching strategy has a place in the curriculum. The final selection must lie with the teacher in the classroom who knows the interests and abilities of his students.

Comments, criticisms and suggestions from teachers are welcome. All correspondence should be addressed to :

The Subject Officer (Science),
Directorate of Studies,
Box 33 G.P.O.,
SYDNEY. 2001.

CONTENTS

The contents of the Physics item collection is contained in two volumes, volumes twenty and twenty one of the Science library of test items.

For convenience, the broad categories in each have been listed in both volumes.

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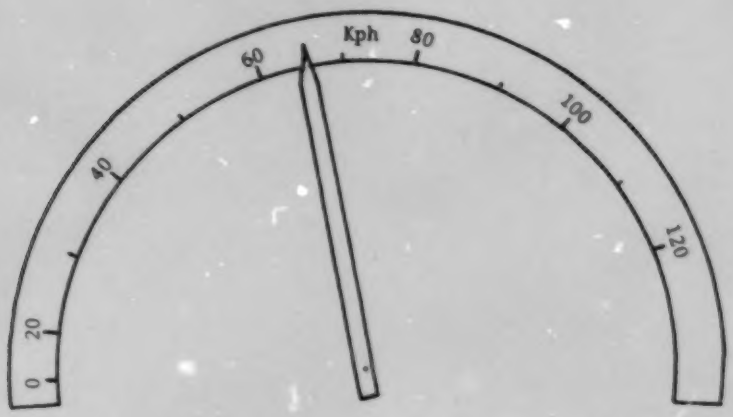
MEASUREMENT AND SCALES

A car speedometer is pictured below.



The speed registered on the speedometer is closest to

A. 50 kph.
B. 60 kph.
C. 65 kph.
D. 70 kph.

C.5

1

The table on the right shows names of several particles which are found in sedimentary rocks.
The figure drawn below is two (2) metres tall.

SIZE (mm)	PARTICLE
> 520 mm	BOULDER
64 - 520 mm	COBBLE
2 - 64 mm	PEBBLE
$\frac{1}{16}$ - 2 mm	SAND

Which of the rocks drawn alongside the figure would be called a <u>boulder</u>?

A. 1 only.
B. 2 only.
C. 1 and 2 only.
D. 1 and 2 and 3.

C1.

11

2

An altimeter is constructed in a similar way to a clock, except that it has 3 hands.

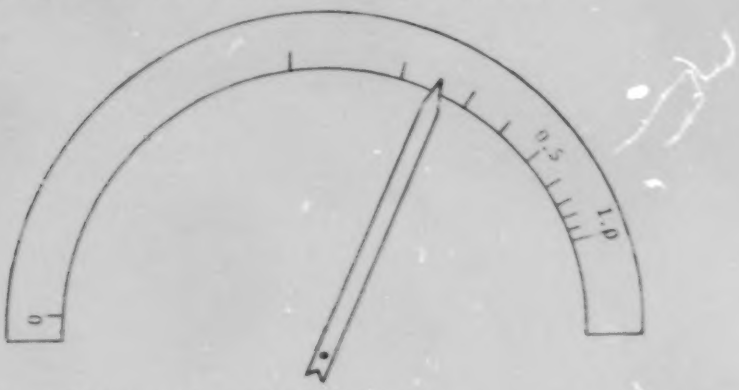
Using this information, what is the reading on the altimeter on the right?

A. 8,350
B. 3,850
C. 5 380
D. 3,580

C1.

3

The next question refers to this diagram.



The reading on the meter above is

A. 0.115
B. 0.12
C. 0.25
D. 2.5

C3.

4

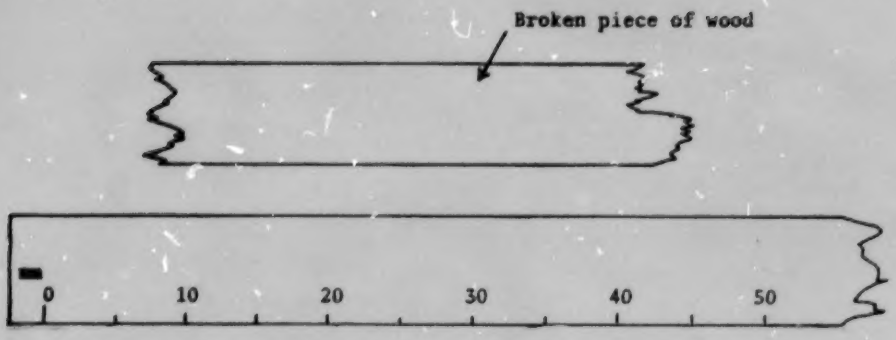
The time shown on the stop-watch drawn below is

A. 1 minute 46 seconds.
B. 46 minutes 6 seconds.
C. 5 minutes 46 seconds.
D. 6 minutes 54 seconds.

C4

5

This question refers to this picture.

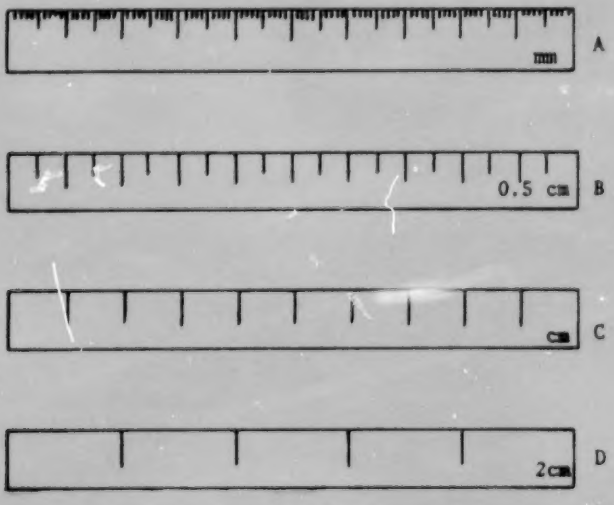


A student wishes to cut a rectangular piece of wood from the broken piece pictured above the enlarged millimetre scale. The longest piece he could expect to obtain would be

A. 10mm. B. 30mm. C. 40mm. D. 45mm.

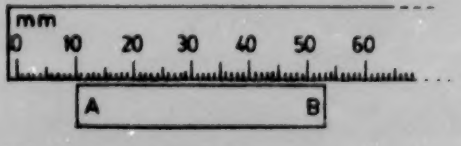
B5. 6

Which of the rulers drawn below do you think is the least accurate measuring instrument?



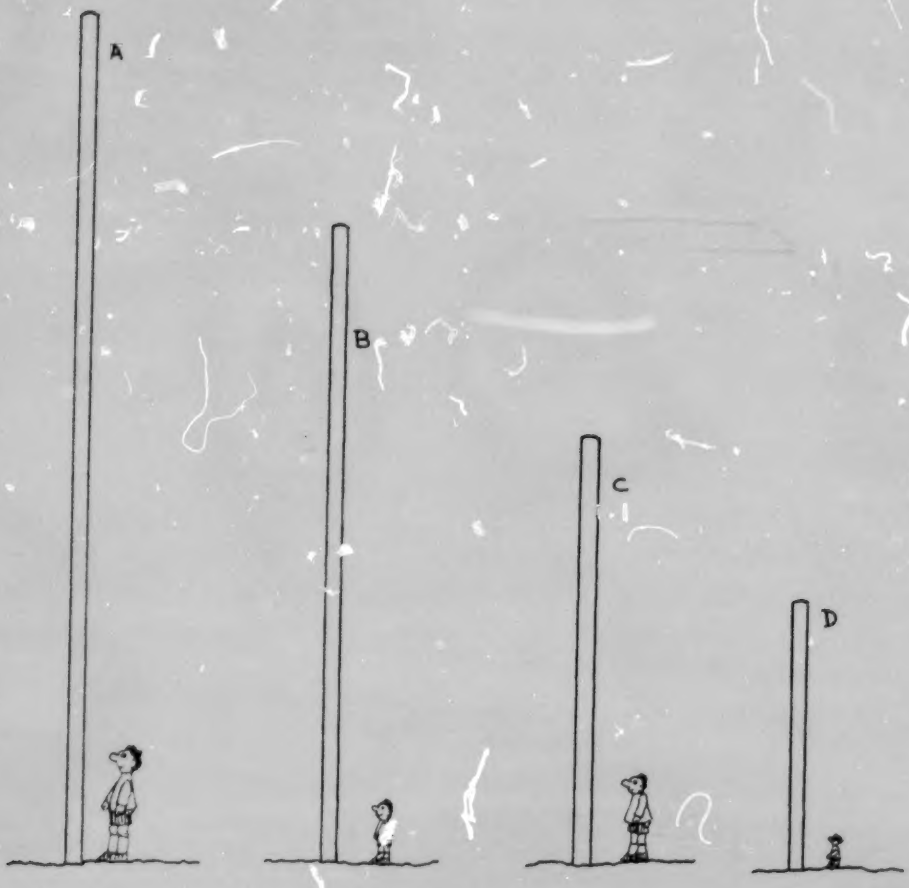
D5 7

What is the length of the object AB as shown in this diagram?



B5 A. 33mm. B. 43mm. C. 53mm. D. 63mm. 8

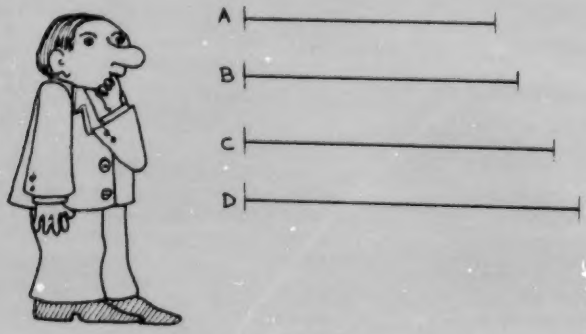
If the people drawn below are <u>all</u> two metres high, which flagpole is the highest?



B3.

9

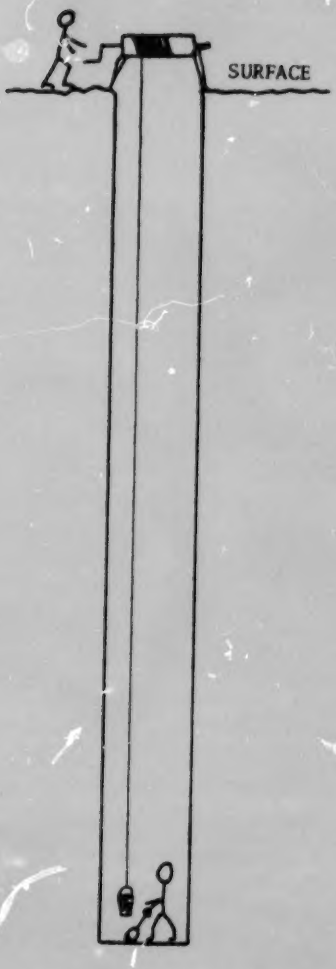
Which line drawn below is as long as the man is tall?



C5.

10

The man in this picture is digging a well. If the man is 2 metres tall, approximately how deep is the well?

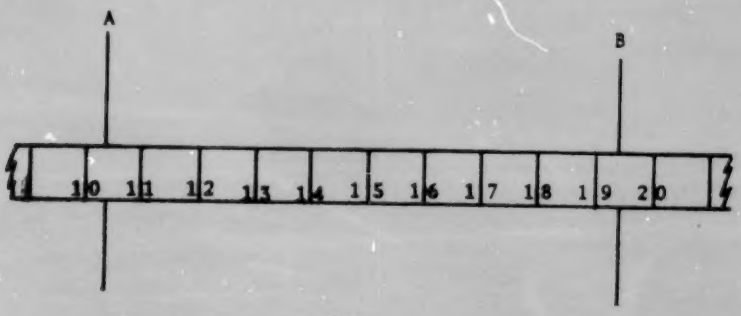


A. 15 metres.
B. 20 metres.
C. 25 metres.
D. 30 metres.

B.3

11

This question refers to the picture below.



The distance between the two lines A and B is nearest to

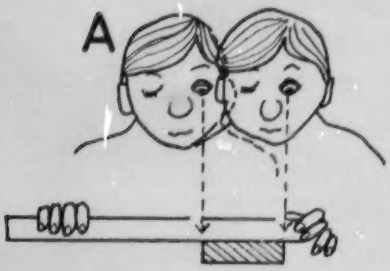
A. 10 cm.
B. 9 cm.
C. 19 cm.
D. 20 cm.

B.4

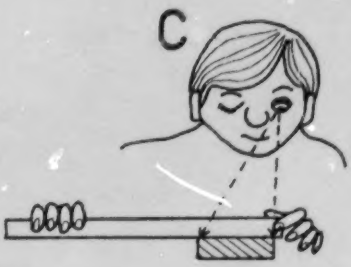
12

Which student in the drawings below could make the most accurate measurement of the shaded object?

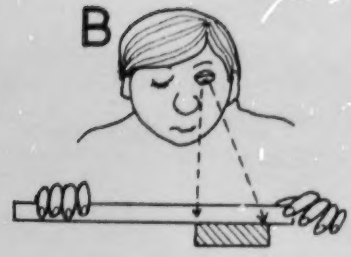
A



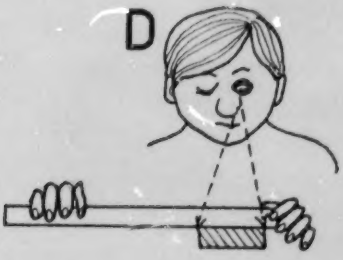
C



B



D



A3.

13

A kilogram is closest to the mass of a

A. match stick.
B. text book.
C. boy.
D. car.

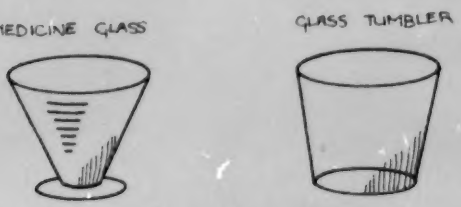
B3 14

A pipette is marked "accurate to B.S. 604 at 20°C". The temperature is given because

A. glass can crack at high temperatures.
B. some liquids expand when heated.
C. some liquids boil when heated.
D. glass expands when heated.

D1. 15

The next question refers to these two diagrams.



Glasses for measuring medicine are often shaped like the one above. The probable reason why they are not shaped like an ordinary glass tumbler is that

A. people will be less tempted to drink out of them.
B. it is an easier shape for the glass makers to construct.
C. the tapered sides make the glass less likely to tip over.
D. the accuracy of measurement of small quantities is increased.

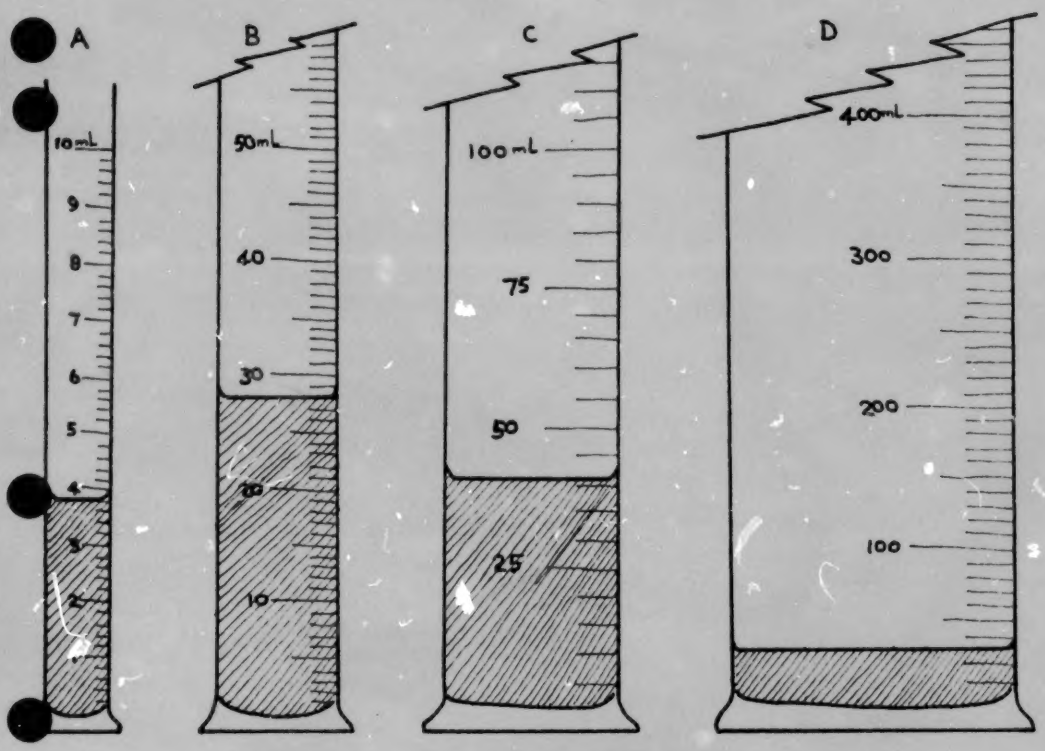
D5. 16

One litre of water is closest to the amount of water that fills a

A. large soft drink bottle.
B. tea cup.
C. swimming pool.
D. bath tub.

A5 17 17

The next six questions refer to the following diagrams.



Which container contains 28 millilitres of water?

A. A. C. C.
B. B. D. D.

B.5

18

Which of the containers drawn above would you use to most accurately measure 35 millilitres of water?

A. A. C. C.
B. B. D. D.

B.3

19

On which cylinder does each scale mark represent 0.2 millilitres?

A. A. C. C.
B. B. D. D.

A.3

20

On which cylinder does each scale mark represent 1 mL ?

A. A B. B C. C D. D

B.3 21

On which cylinder does each scale mark represent 5 millilitres?

A. A B. B C. C D. D

C.3 22

On which cylinder does each scale mark represent 10 mL .?

A. A B. B C. C D. D

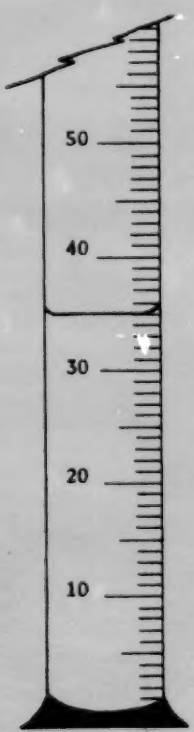
D.3 23

The number 18.76 expressed to the nearest order of magnitude is

A. 10^1 B. 10^2 C. 10^3 D. 10^4

A.2 24

This question refers to the picture on the left.

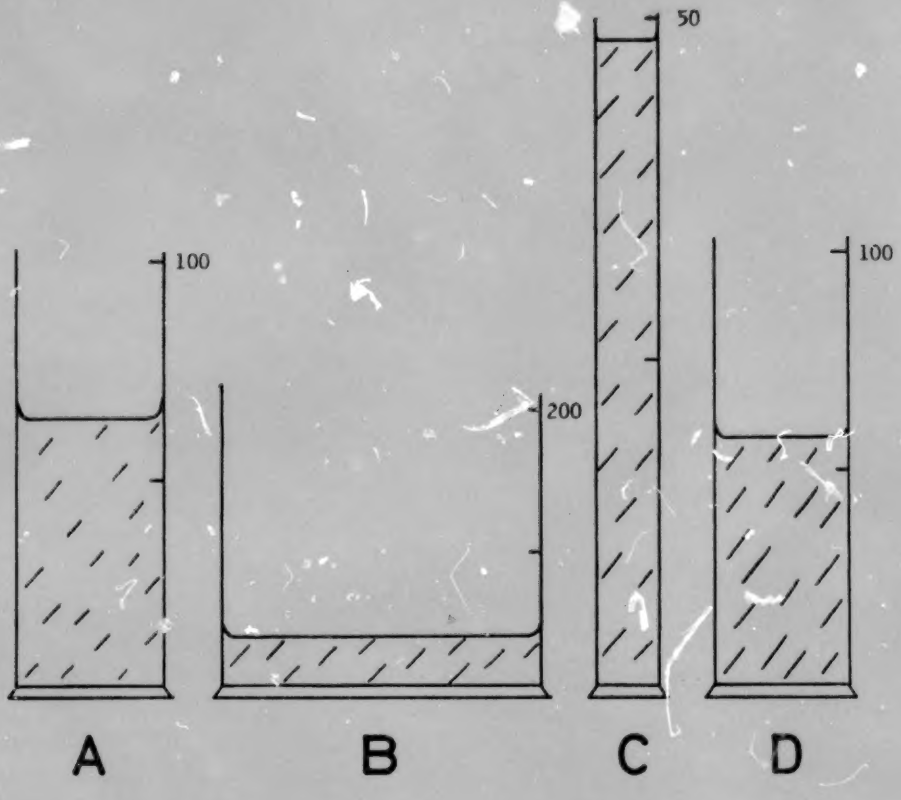


How much water is in the measuring cylinder?

A. 30.5 mL.
B. 35 mL.
C. 35.5 mL.
D. 36 mL.

B.3 25

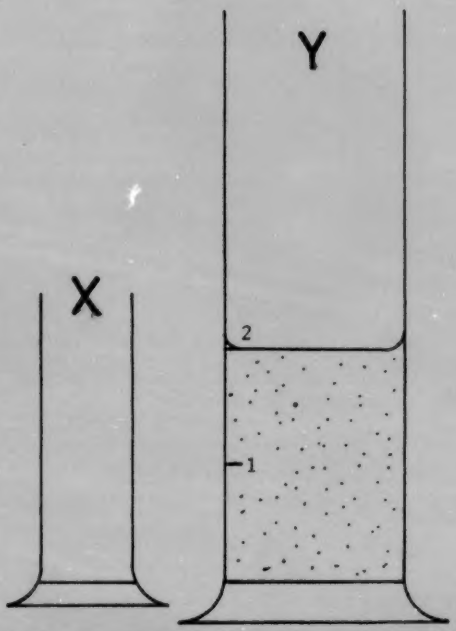
The next question refers to the diagrams below.



A5 Which of the containers drawn above contains the most liquid? 26

In an experiment to find the volume of container Y drawn right, a student added water from container X marking the level in Y each time.
If the volume of container X is 50 mL, what is the volume of container Y (in mL)?

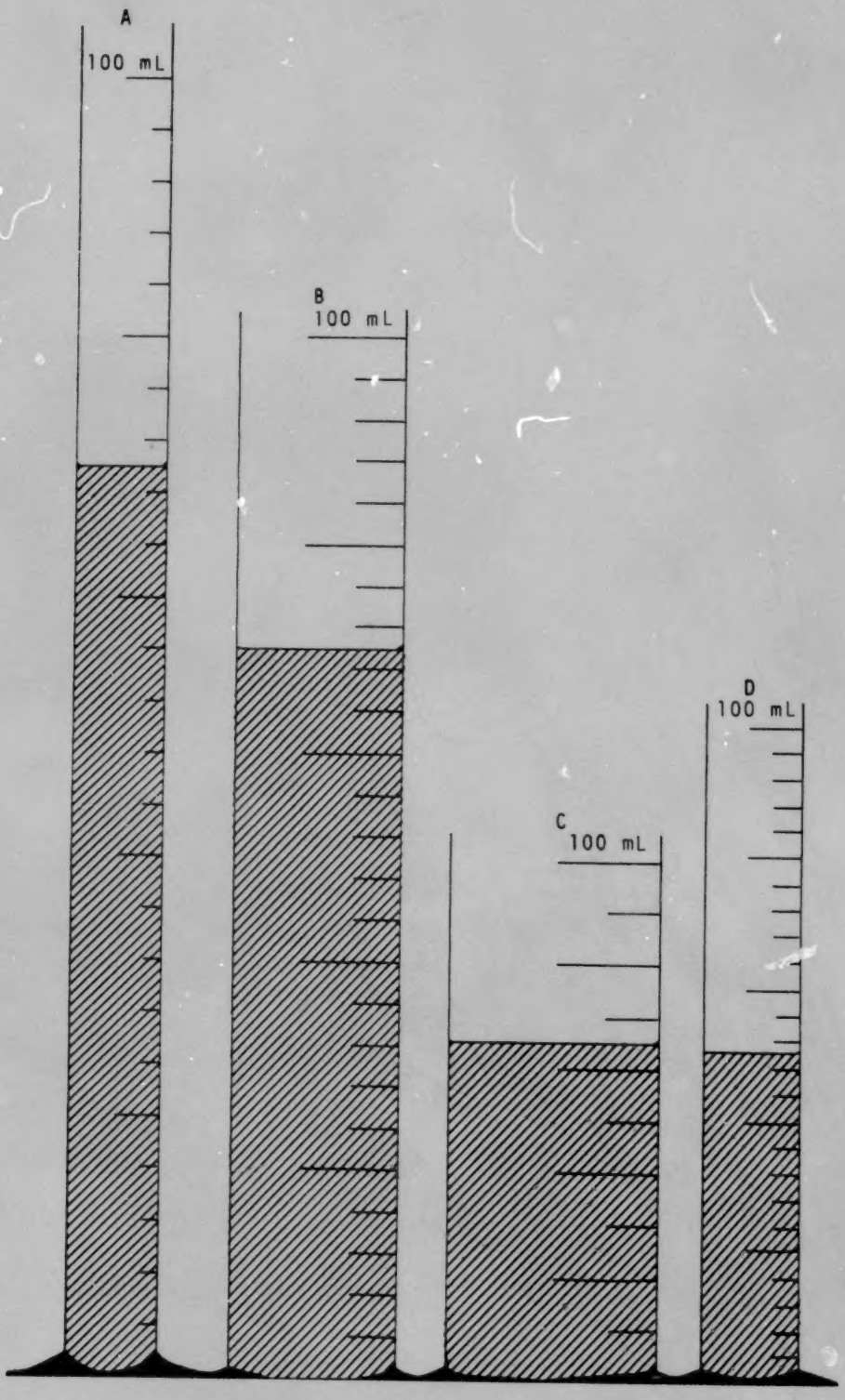
A. 2
B. 5
C. 250
D. 500



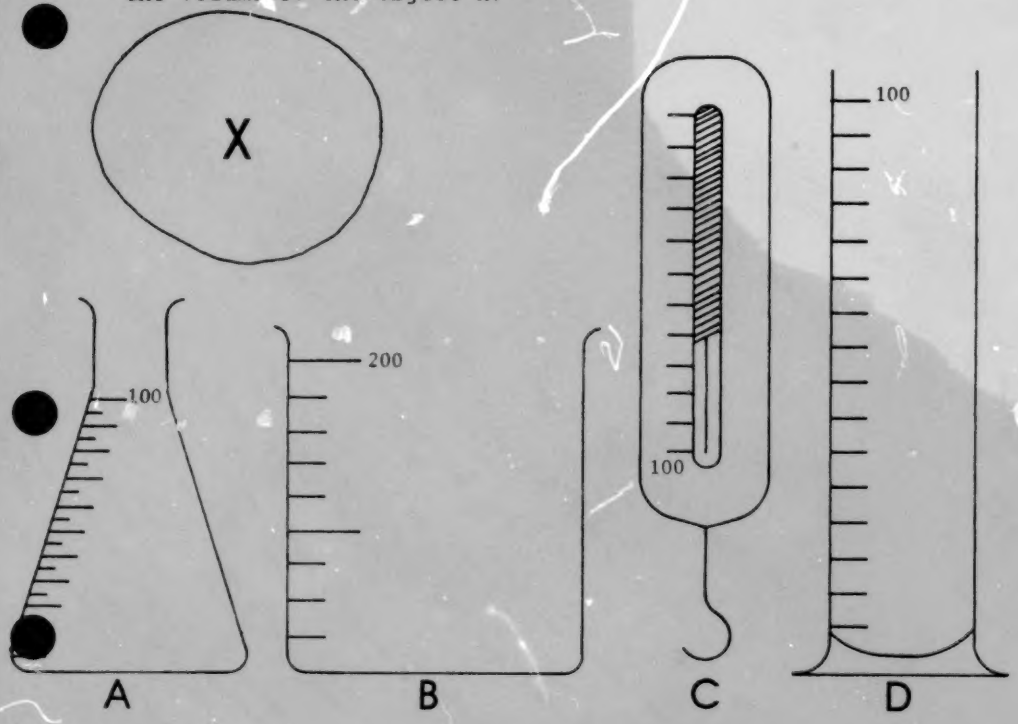
C4. 27

The four measuring cylinders shown below have *not* been drawn to scale.

Which cylinder contains 65 millilitres (mL) of liquid?



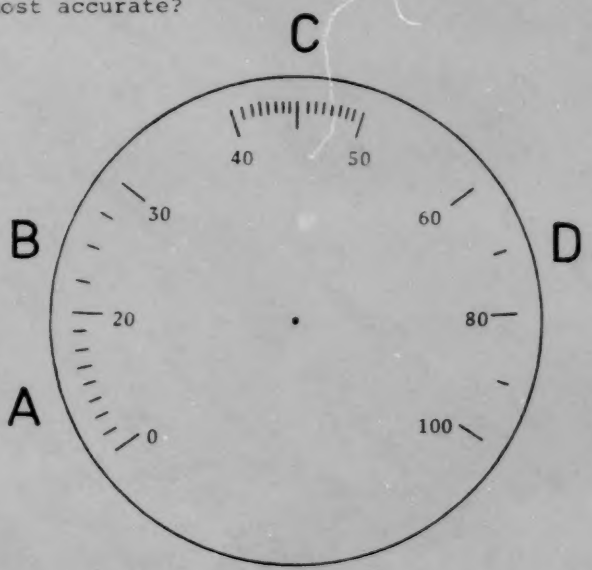
The diagram below shows an object X and four pieces of apparatus, all drawn to the same scale. Which piece of apparatus would give the most accurate measurement of the volume of the object X?



B1.

29

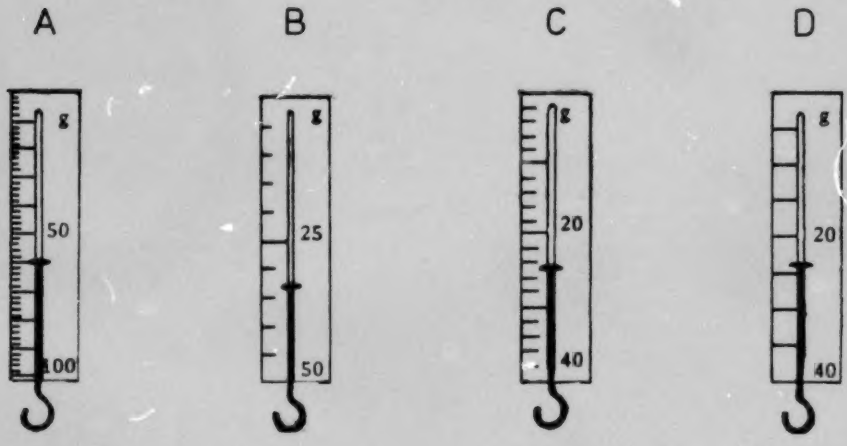
Which section on the dial of the instrument drawn below would be most accurate?



C3.

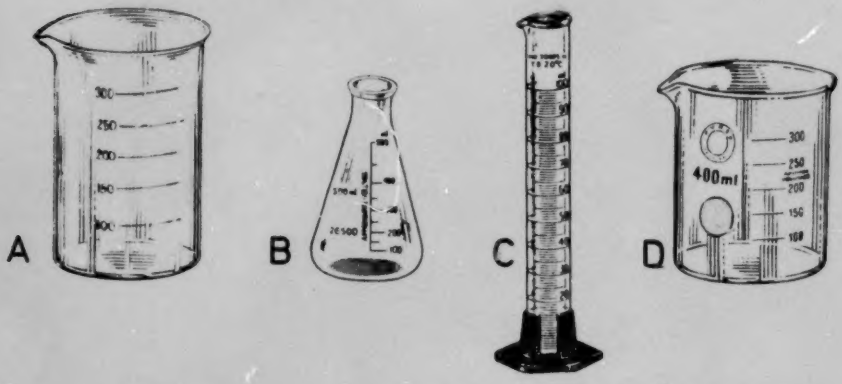
30

The pictures below show four different spring balances and their measuring scales. Study the diagrams and then answer the question which follows them.



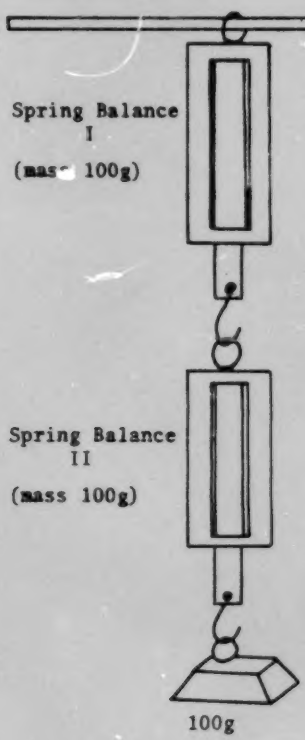
Which of the spring balances would give the most accurate measurement of the mass of an object? (Assume that the object can be measured on each balance). 31

The next question refers to these diagrams.



C1 Which of the above containers would be most accurate for measuring out 400mL of water? 32

This question refers to the diagram below which shows two spring balances each of 100 grams supporting a mass of 100 grams.



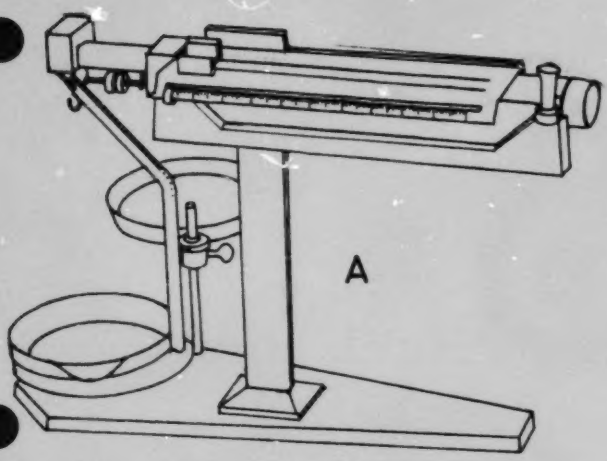
The correct indication of the two spring balances is

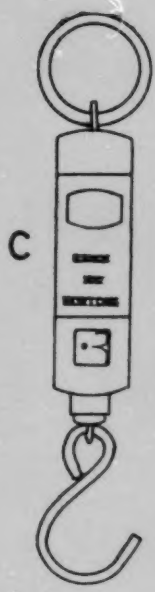
	Spring Balance I	Spring Balance II
A.	100 grams	100 grams
B.	100 grams	200 grams
C.	200 grams	100 grams
D.	200 grams	200 grams

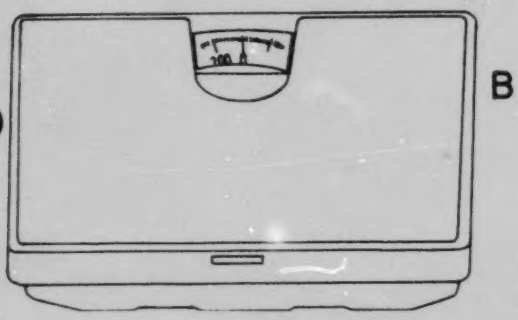
C.2

33

Which of the following balances would be the most suitable for weighing out 15.00g of sodium chloride?

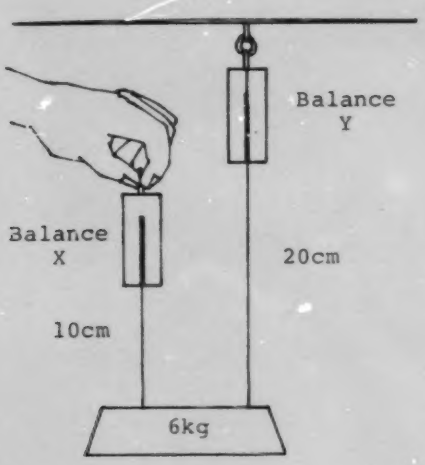






34

The next two questions refer to the diagram below.



Which set of readings gives the correct readings for balances X and Y?

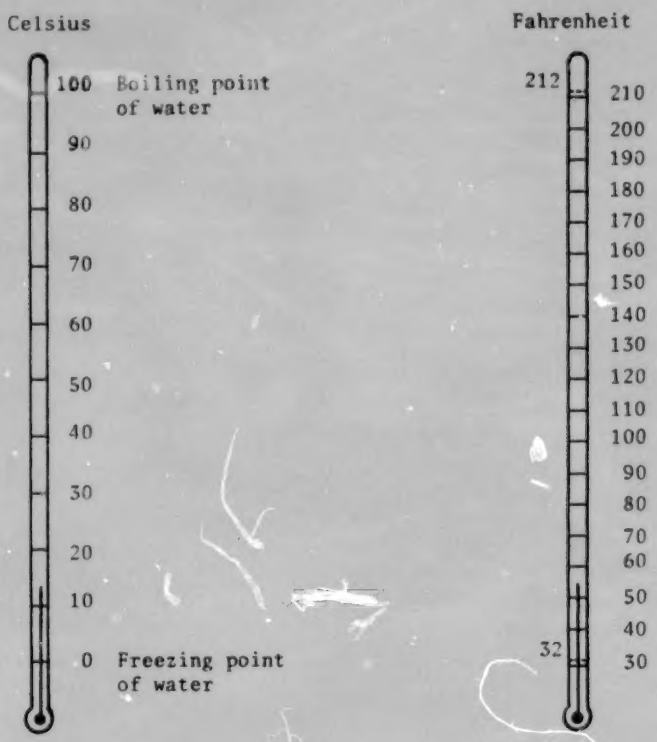
	Balance X	Balance Y
A	2kg	4kg
B	3kg	3kg
C	4kg	2kg
D	6kg	0kg

B1 35

If balance X was lifted until it read 3.5kg, then the reading on Y would be

B2 A. 1.5kg B. 2.5kg C. 3.0kg D. 3.5kg 36

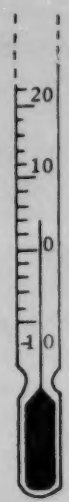
The next question refers to these two drawings of thermometers.



A student measured the temperatures of two different liquids. Liquid A was 30°C. Liquid B was 50°C. What were the temperatures of A and B in Fahrenheit?

A. 80°F, 130°F.
B. 85°F, 120°F.
C. 85°F, 130°F.
D. 90°F, 120°F.

37



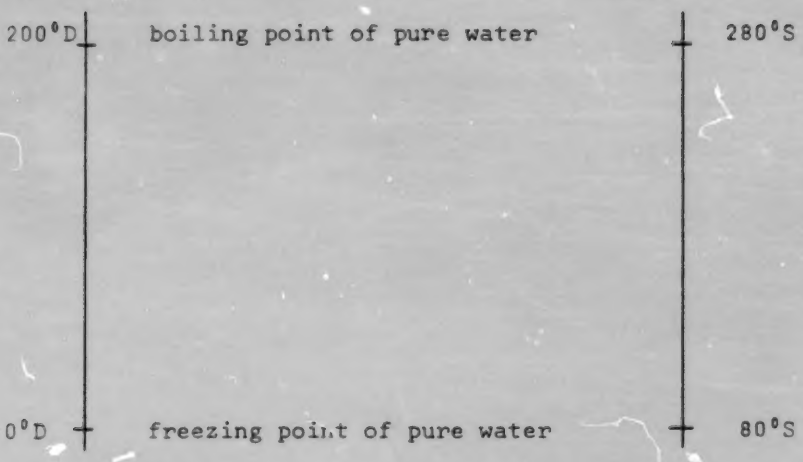
The reading on the thermometer is closest to

A. 0°C.
B. 2°C.
C. 4°C.
D. 6°C.

C.4

38

A scientist is thinking of using these two temperature scales:



If room temperature is 10°D, what is the temperature on the other scale?

A. 10°S
B. 90°S
C. 100°S
D. 270°S

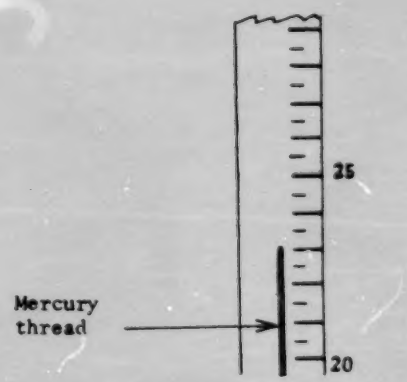
B.4

39

The next question refers to the diagram below, which is a portion of a 0° - 50° thermometer.

The temperature reading on the thermometer would be closest to

A. 26°C.
B. 23°C.
C. $22\frac{1}{6}$°C.
D. $20\frac{1}{2}$°C.



B.4

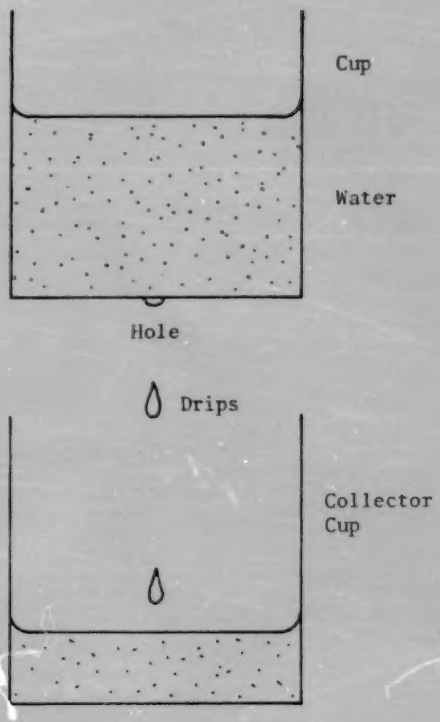
40

A student made a water clock by letting water drip out of a paper cup through a hole in the bottom.

He noticed that the amount of water shown as collected took 10 minutes to drip from the cup.

How long will it be, before the student's clock "stops"?

A. 15 minutes.
B. 25 minutes.
C. 35 minutes.
D. 45 minutes.



B2.

41

The next two questions refer to the information below.

Greenland is 12 hours behind Sydney in time and it takes 24 hours to fly from Sydney to Greenland *via* the U.S.A.

If we left Sydney at 9.00a.m. Tuesday 22nd April and flew across the Pacific Ocean to Greenland, then we would arrive at

A. 9.00p.m. Monday 21st April Greenland time.
B. 9.00a.m. Tuesday 22nd April Greenland time.
C. 9.00p.m. Tuesday 22nd April Greenland time.
C3 D. 9.00a.m. Wednesday 23rd April Greenland time.

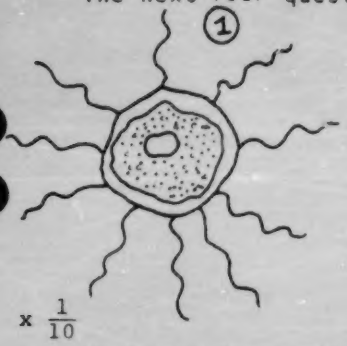
42

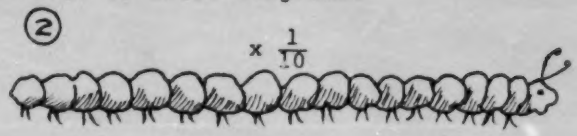
If it also takes 24 hours to fly across Asia and Europe to Greenland, then

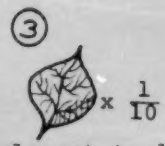
A. flying across Asia loses a day compared with flying across the Pacific.
B. flying across the Pacific loses a day compared with flying across Asia.
C. you arrive at Greenland at the same time no matter which way you fly.
C3 D. you lose a day (24 hours) no matter which way you fly.

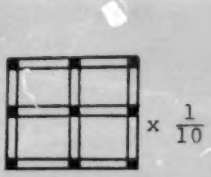
43

The next four questions refer to these diagrams.









Which object would be closest to 100 millimetres in size, life size?

C1. A. 1 B. 2 C. 3 D. 4 44

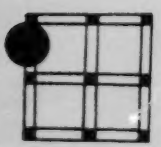
How long, in millimetres, would object (2) be life size?

D1. A. 10 B. 90 C. 450 D. 900 45

Which object would be <u>smallest</u> when looked at life size?

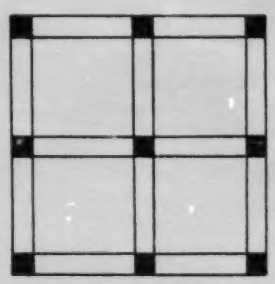
C2. A. 1 B. 2 C. 3 D. 4 46

If object (4) was to be redrawn to a $\times\frac{1}{5}$ scale, which diagram best represents the correct drawing?


A

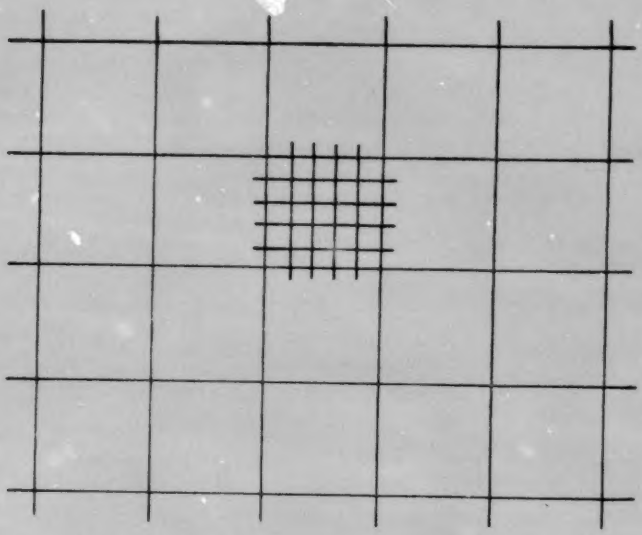
B

C


D

D2. 47

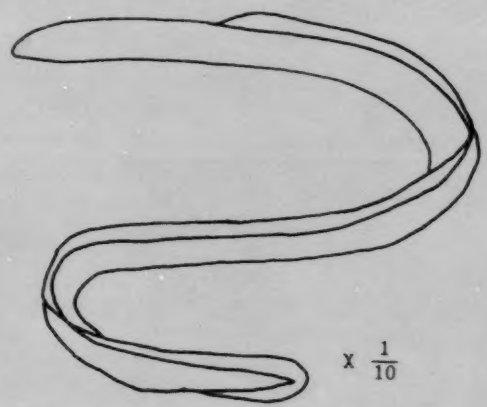
Look at the grid drawn below. If each of the large squares is 1 metre x 1 metre, what is the length of a side of a small square?



A. 5 millimetres.
B. 20 centimetres.
C. 40 centimetres.
D. 5 metres.

B.3 48

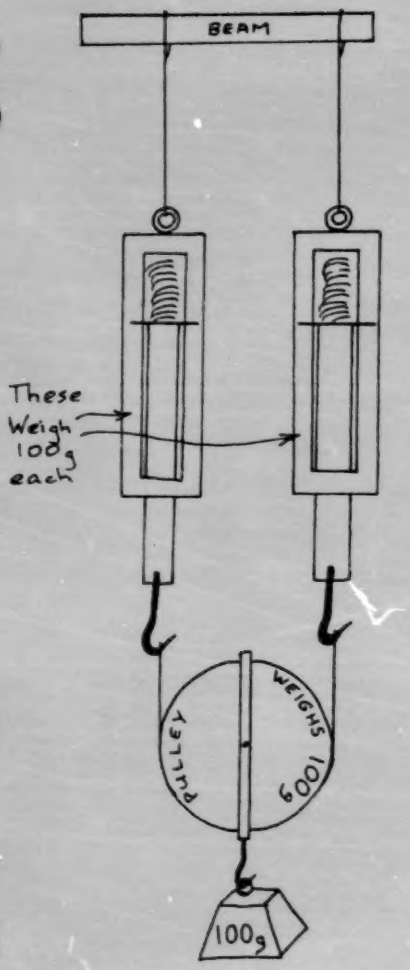
The next question refers to this drawing



The magnification on the diagram above indicates that the length of the organism would be closest to

C1 A. 20 cm. B. 2.0 cm C. 200 cm. D. 2000 cm 49

SIMPLE MACHINES



The diagram opposite shows a beam supporting two spring balances and a pulley off which is hanging a mass. The spring balances weigh 100 grams each. The pulley weighs 100 grams and the mass hanging off the pulley weighs 100 grams.

From this situation we can definitely conclude that the spring balances indicate identical readings of:

A. 100 grams.
B. 200 grams.
C. 300 grams.
D. 400 grams.

A1.

50

The efficiency of a machine can be calculated by dividing the work output by the work input.

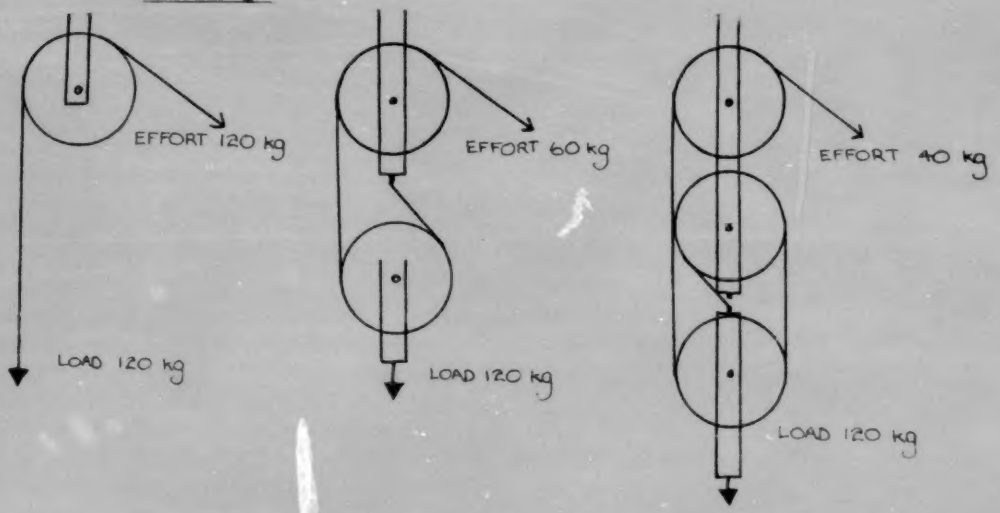
$$\text{Efficiency} = \frac{\text{Work Output}}{\text{Work Input}}$$

A force of 500N was exerted on the rope of a block and tackle and the rope is pulled in 10m. This work causes a weight of 2500N to be raised 1.5m. What is the efficiency of this machine?

A. 30% B. 60% C. 75% D. 133⅓%

51

Study the following diagrams. These show different pulley systems a student used to find the effort needed to move a load of 120 kg.



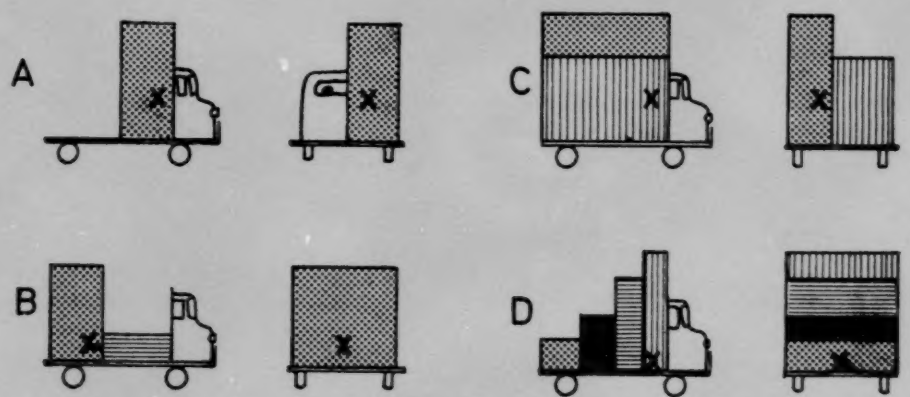
Using the information above, if he wished to move the load of 120 kg. using an effort of only 20 kg. he **would** need a system with

A. 4 pulleys.
B. 6 pulleys.
C. 8 pulleys.
D. 10 pulleys.

B3.

52

Each truck in the diagrams below has a load of various shapes and sizes.
The centre of mass of each truck is marked "X" in both the back and side views.

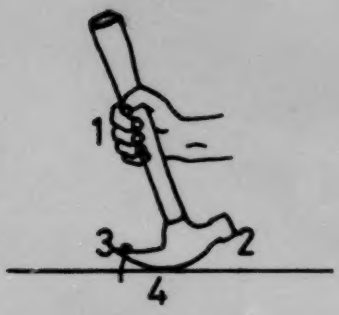


Which truck has its centre of mass in a position which makes that truck safer than the others on this basis?

A3

53

In the diagram, the load, pivot and effort are located at

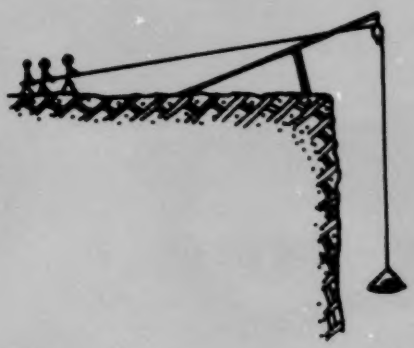


	Pivot	Load	Effort
A	1	4	2
B	1	3	2
C	2	4	1
D	2	3	1

B1

54

The 'Police Rescue Squad' often uses a single fixed pulley to lift injured people up cliff faces. The advantage of using a single fixed pulley in this situation is that



A. it changes the direction of the pull.
B. it takes less effort to lift the load.
C. it works as a force magnifier.
D. you have a mechanical advantage.

A2

55

A single fixed pulley is used to

A. change the direction of the pull.
B. take less effort to lift the load.
C. work as a force magnifier.
D. give a mechanical advantage.

A2

56

You may not realise how often you use simple machines. Which of the following is NOT a machine?

A. Can opener.
B. Car engine.
C. Door handle.
D. Egg beater.

B1

57

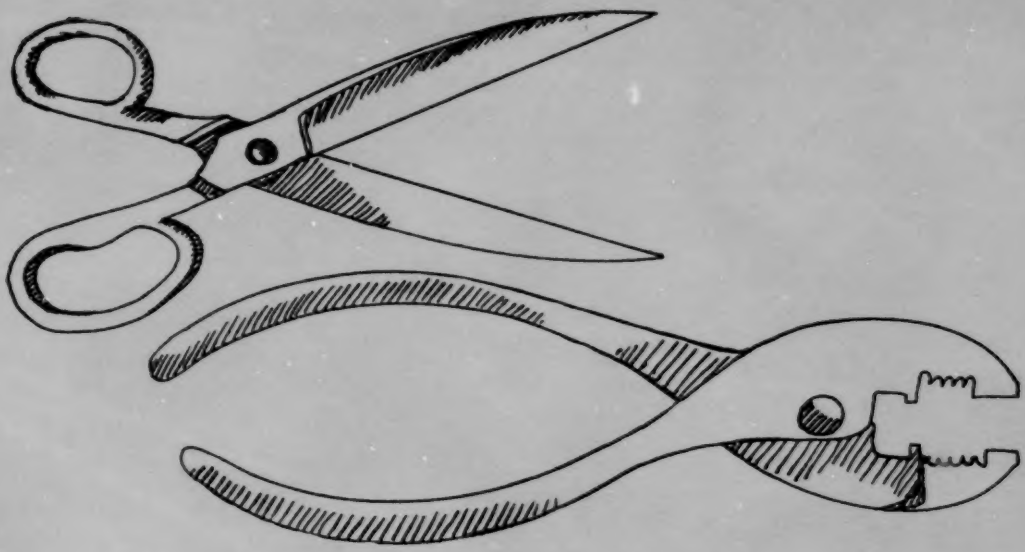
A lever is a rigid bar which is able to turn on a point called the pivot. A first order lever has the pivot situated between the load and the effort. Which one of the following machines is an example of a first order lever?

A. Boat oar.
B. Scissors.
C. Tweezers.
D. Wheelbarrow.

B2

58

This question refers to the following diagrams.



The pliers can exert a much greater force than the scissors. This is because the pliers

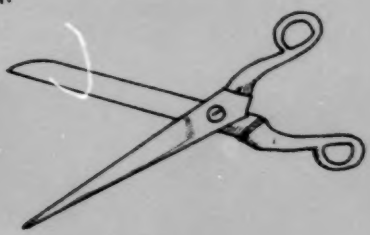
A. are heavier than the scissors.
B. have longer handles than the scissors.
C. grip better than the scissors.
D. are not as sharp as the scissors.

B3.

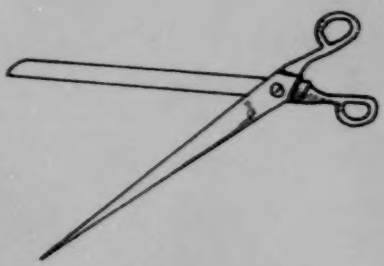
59

If you wanted to cut a piece of thick cardboard, with which pair of scissors from the following would you need to apply least force?

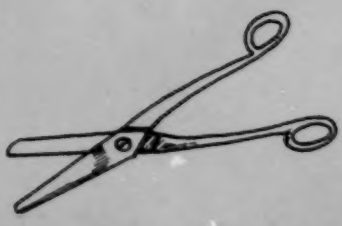
A.



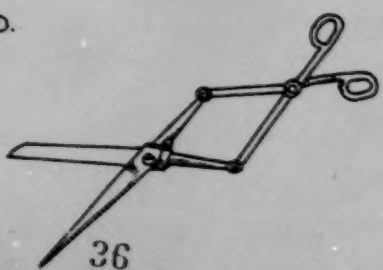
C.



B.



D.



B2.

If the large sprocket wheel on an eggbeater has 48 teeth and the small sprocket wheel has 12 teeth, how much faster will the 'beaters' turn when the handle is turned?

A. 4

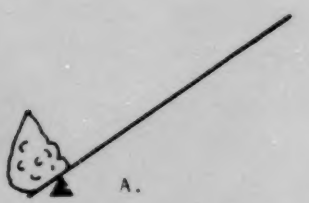
B. 36

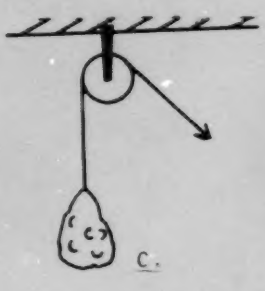
C. 48

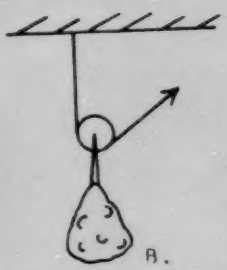
D. 60

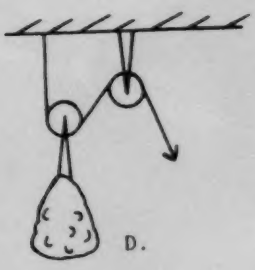
A3 61

Which of the following machines would make is easiest to lift the bag of potatoes?









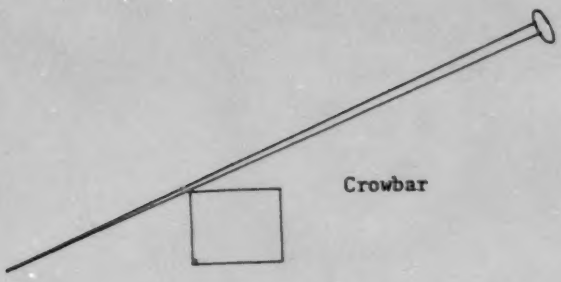
A1 62

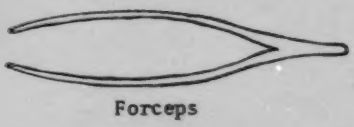
The inclined plane is used to

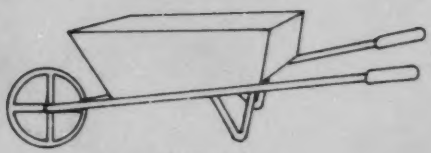
A. raise loads against the force of gravity.
B. allow for greater acceleration.
C. reduce the weight of a body.
D. eliminate the effects of friction.

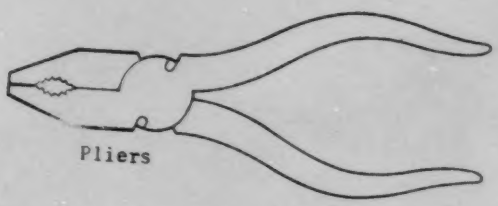
A3 63

Four simple types of machines are drawn below.









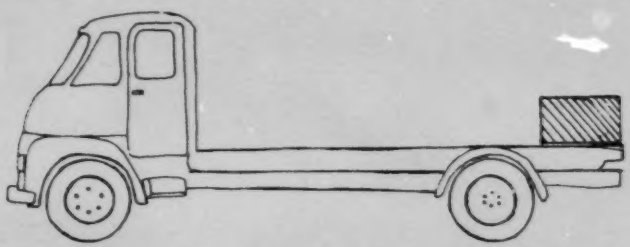
The two machines which are similar in relation to the load and effort positions are

A. pliers and crowbar.
B. forceps and wheelbarrow.
C. crowbar and forceps.
D. wheelbarrow and pliers.

A.3

64

The next question refers to the diagram below.



You have to unload the large, heavy crate from the back of the truck.

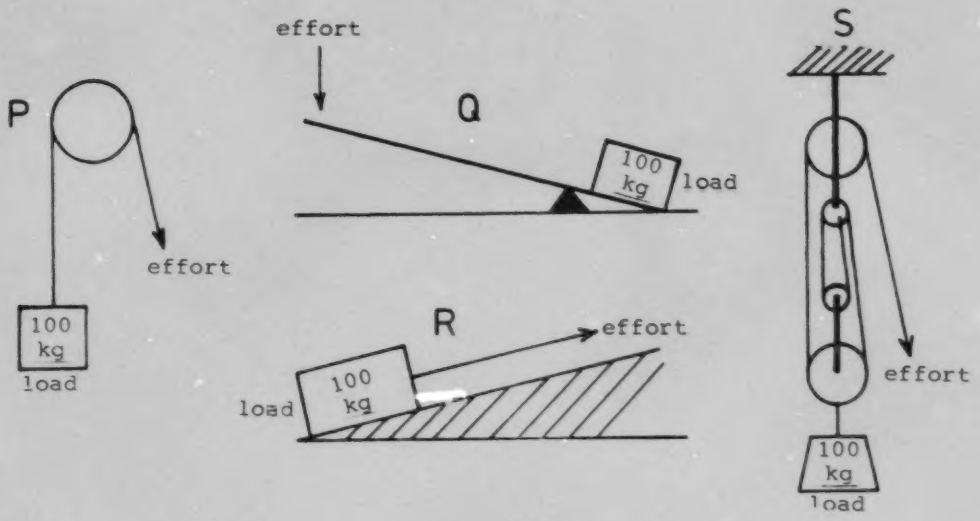
A machine you would use to do this with reasonable ease is

A. lever.
B. ramp.
C. pulley system.
D. crowbar.

B.3

65

The next two questions refer to the diagrams below.



In which case(s) would an effort of 100 kg force cause the 100 kg load to move?

A. P only
B. Q and R only.
C. P, Q and S only.
D. Q, R and S only.

66

Which machine would have the highest mechanical advantage?

D5 A. P B. Q C. R D. S

67

Which of the following machines depends on Pascal's Principle for its functioning?

A. Block and tackle.
C1 B. Crow bar.
C. Hydraulic jack.
D. Screw jack.

68

A first order lever has the fulcrum situated between the load and the effort. Which of the following is an example of a first order lever?

A. Oars for rowing a boat.
B3 B. Pair of scissors.
C. Pair of sugar cube tongs.
D. Wheelbarrow.

69

Machines vary in their advantage to man. The most advantageous machines make the job easiest, requiring the least effort. Which of the following devices would make lifting of a 100 kg mass easiest?

A. A fixed pulley.
B. A moveable pulley.
C. A 45^0 inclined plane.
D3 D. A block and tackle of four pulleys.

70

In the operation of an automobile, the machine which makes the operation easier is the

A. clutch.
B. engine.
C. gears.
D. pistons.

71

A machine is a device to

A4
A. make work easier.
B. eliminate work.
C. do more work.
D. use less energy.

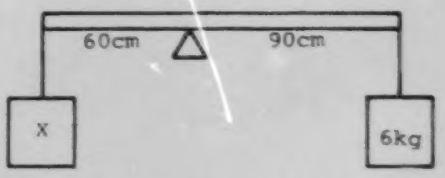
72

Machines are used for

D1
A. lifting loads only.
B. exerting forces.
C. saving time.
D. working conveniently.

73

The next question refers to the following diagram

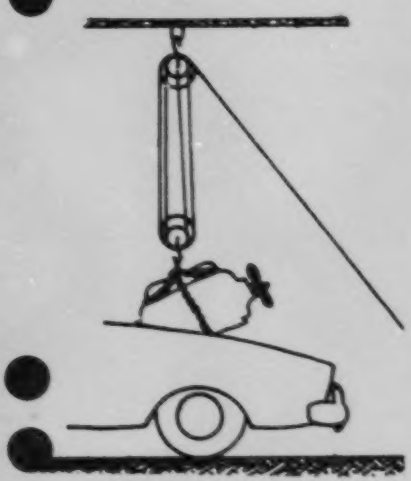


The mass of X for equilibrium is nearest

C3 A. 4kg B. 6kg C. 9kg D. 15kg

74

Peter likes fixing the engines of cars. To get the engine out of a car, he uses a block and tackle that he bought at the local hardware shop. Stamped on the block and tackle is the statement MA = 4.
If the engine weighs 400 newtons what effort must he supply to lift the engine out.

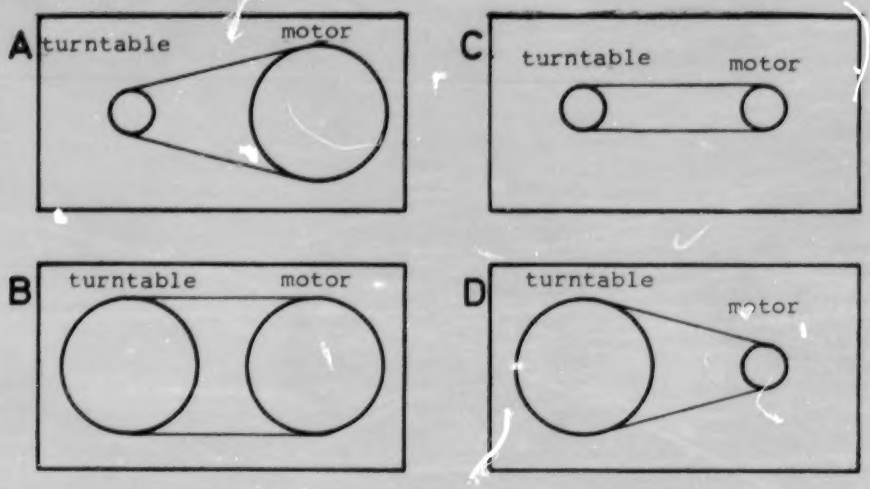


A. 50 newtons.
B. 80 newtons.
C. 100 newtons.
D. 1600 newtons.

C2

75

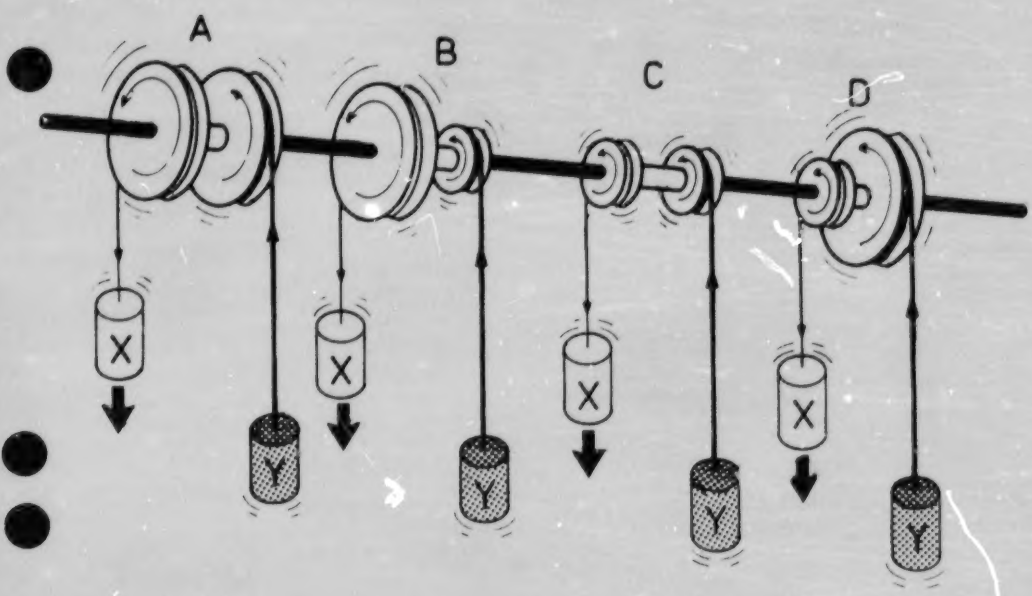
A small electric motor which spins at 100 revolutions per minute is to be used to drive a record player turntable at $33\frac{1}{3}$ revolutions per minute. Which one of the four systems below is most likely to turn the turntable at the desired speed?



D3

76

Study the wheel and axle arrangements shown. X is moving down at 10 centimetres per second. In which one of the four systems is it possible for Y to move up at 5 centimetres per second?



D1

77

PROPERTIES OF MATTER

Four substances from the planet Xenos were given various identifying tests by scientists. The results of some of these tests are listed below.

Substance	Able to be bent	Conduct Electricity	Conduct Heat	Brittle
A	YES	YES	YES	NO
B	YES	YES	NO	YES
C	YES	NO	YES	YES
D	NO	YES	YES	YES

On the basis of this information, which substance is most similar to a metal?

A4. 78

A porthole in an aluminium frame was carefully fitted into the steel hull of a ship. In spite of neat fitting, water leaked into the cabin.

Which statement below best accounts for this?

A. Aluminium forms a protective coating which changes the size of the porthole.
B. Iron and aluminium expand at different rates.
C. The iron rusts quickly in sea water and lets the water in.
D. Hotter air inside the cabin expands the aluminium more than the iron.

B3. 79

ENERGY

The next two questions refer to the following information.

The objects listed in the two questions below have energy in many different forms. For each set of objects in a question, choose from the list below, the form of energy which is present in all of them.

A. electrical.
B. heat.
C. light.
D. potential.

A5	drill	radiator	lightglobe	refrigerator	80
D4	petrol	magnesium ribbon	battery	wood logs	81

Which one of the following examples does not involve a change from one form of energy to another?

A. Oil being burnt to heat a house.
B. Tyres of a car getting hot due to a lot of stopping and starting at intersections.
C. Hot tea poured into a cup makes the cup hot.
D. A hydroelectric power station.

C2 82

For each question, choose the energy change (A,B,C or D) which occurs:

A. electrical energy → sound energy.
B. heat energy → kinetic energy.
C. potential energy → kinetic energy.
D. kinetic energy → sound energy.

C3 The Jumbo jet leapt forward as the Captain opened the throttle. We were on our way. 83

A3 Jenny suddenly turned on her transistor radio to listen to the Little River Band. 84

The efficiency of energy converters such as a car engine, a generator, etc., is fairly low. The energy is lost mainly as

A. exhaust gases.
B. heat energy.
C. sound energy.
D. work.

B1 85

The next question refers to the following information.

A Highway Patrol car travelling along an expressway suddenly spots a stolen vehicle and rapidly accelerates from 60 kph to 120 kph.

By what factor has the Highway Patrol car increased its kinetic energy?

A. 1 time
B. 2 times.
C. 3 times.
D. 4 times.

D1 86

The next question refers to the following information.

Mary, Bill and Peter were arguing about where energy comes from and where it goes.

Peter: 'When a car has kinetic energy and you slam on the brakes the energy disappears.'

Bill: 'No Peter, in that case you shouldn't say that the energy just disappears, what you should say is that the energy is converted into heat energy.'

Mary: 'But there are times Bill, when energy just appears and disappears out of nowhere. Look at lightning for example.'

Here are four statements about energy. With which one do you agree most?

A. Energy never changes form but often appears and disappears.
B. Energy often changes its form, but it is created and destroyed in the process.
C. Energy is neither created nor destroyed but it can change from one form to another.
D. Energy often changes its form as it appears and disappears.

C3

87

The next question refers to the following information.

Nancy and Allan were investigating what potential energy depends upon, by dropping a marble, a ball bearing and a golf ball from various positions.

What two factors change the amount of potential energy a body has due to its position?

A. Acceleration and height.
B. Height and mass.
C. Mass and acceleration.
D. Work and mass.

B1

88

Solar energy may be the energy source of the future. It is not used extensively at present because

A. solar energy cannot be converted into usable forms.
B. solar energy cannot be concentrated.
C. the sun is running out of energy because it is radiating 8 million tonnes of energy per minute.
D. the cost of equipment for converting solar energy into usable energy forms is too high.

D3

89

In the New South Wales electricity system, the source of the energy is ultimately

A. the earth.
B. gravitation.
C. the moon
D. the sun.

D2 90

Solar energy is converted directly into electrical energy in the

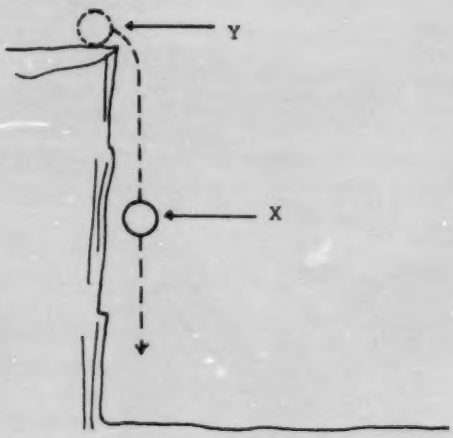
A. hydroelectric power station.
B. light meter.
C. radiometer.
D. windmill.

B1 91

To convert a fuel such as coal into electrical energy most of the energy is lost and only a small percentage gets used by man. The energy is lost mainly as

A. heat energy.
B. kinetic energy.
C. unconverted chemical energy in coke.
D. work.

92



The above diagram shows an object which has dropped from a cliff. Compared with point Y, the object at point X has greater

A. kinetic energy.
B. potential energy.
C. stored energy.
D. total energy.

A3 93

Hydroelectricity is most useful to man because

A. it is virtually pollution free in production.
B. it does not use up our non-renewable natural resources.
C. it is relatively cheap to produce.
D. all of the above.

94

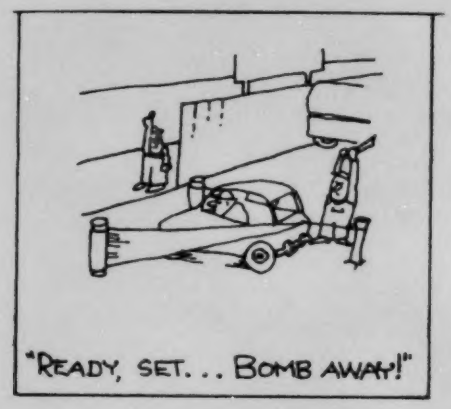
The next question refers to the cartoon below.

Look carefully at the cartoon above. The type of energy being used for the lift is

A. heat.
B. kinetic.
C. photosynthetic chemical.
D. potential.

D3 95

The next question refers to the cartoon below.

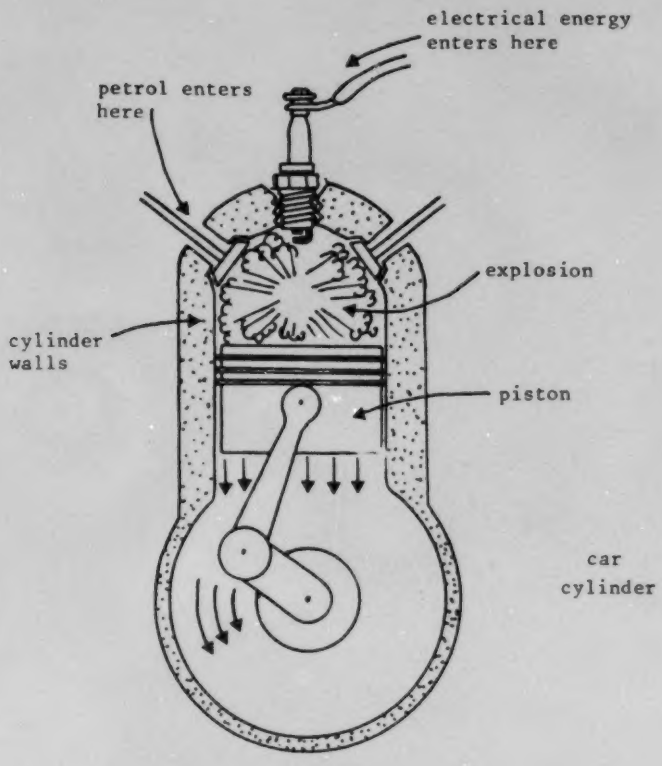


Examine the cartoon above. The energy contained within the stretched rubber band is known as

A. chemical energy.
B. kinetic energy.
C. potential energy.
D. thermal energy.

C3 96

The next question refers to the diagram below.

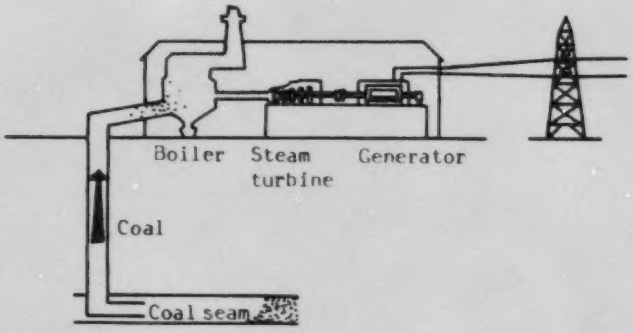


The initial and final forms of energy involved in the car cylinder as pictured, are respectively

A. chemical, potential, kinetic.
B. chemical, potential, heat.
C. electrical, heat.
A3 D. heat, electrical.

97

The next question refers to the following diagram

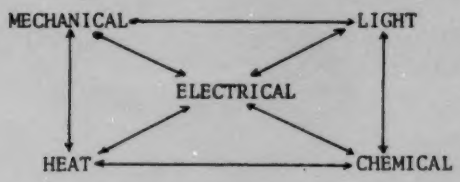


The first and last energy forms in this process are, respectively

A. kinetic, electrical.
B2 B. potential, electrical.
C. potential, kinetic.
D. heat, electrical.

98

The next 4 questions refer to this diagram.



The above diagram was drawn to show that

A. chemical energy produces heat and light.
B. electrical energy produces heat and light.
C. mechanical energy produces heat and electricity.
D. one form of energy can produce another.

D.5 99

Passing an electrical current through water causes it to decompose into hydrogen and oxygen.

The energy change which occurs is shown on the above table as electrical energy to

A. mechanical.
B. heat.
C. light.
D. chemical.

D.3 100

The use of electric engines on trains shows one way man uses electrical energy to produce

A. light energy.
B. chemical energy.
C. mechanical energy.
D. heat energy.

C.5 101

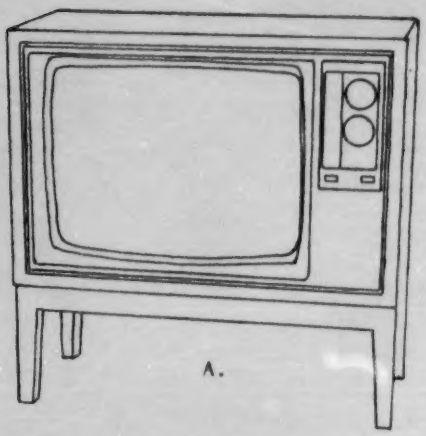
Which energy change occurs in the common torch battery (dry cell)?

A. Light to electrical.
B. Chemical to electrical.
C. Heat to electrical.
D. Mechanical to electrical.

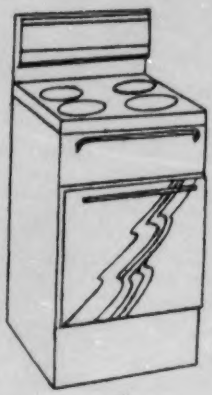
B.3

102

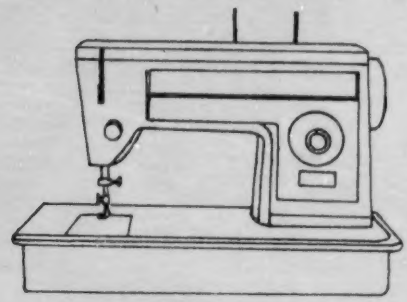
Which of the appliances below involves the conversion of electrical energy to mechanical energy to perform its main function?



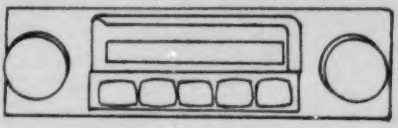
A.



C.



B.

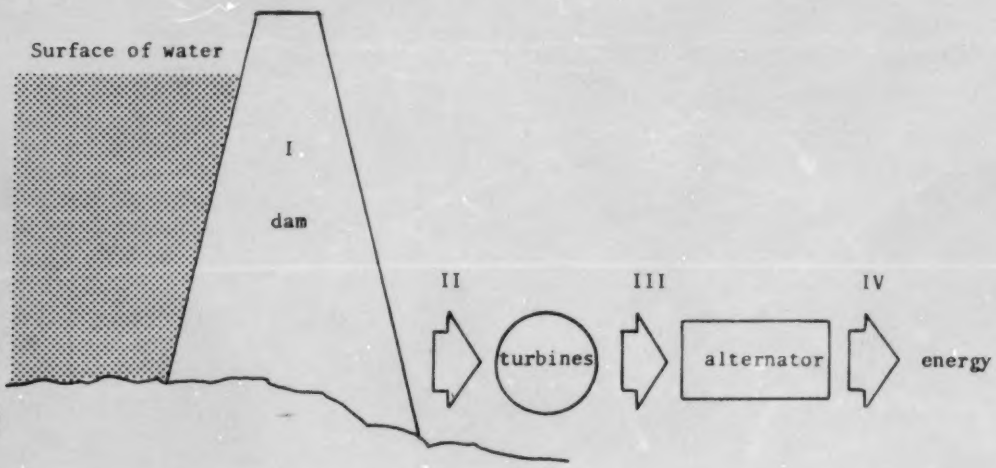


D.

C4

103

The following diagram represents a hydroelectric power-generation system.



The energy change from positions III to IV is

A. potential to electrical.
B. electrical to kinetic.
C. kinetic to electrical.
D. electrical to potential.

C1

51

104

"The atmosphere can be considered as one enormous engine, charged by the energy of the sun. The wind, cloud, rain, and so on that comprise weather are the visible signs of this engine at work as it pumps energy from place to place."

Which of the following words best describes the form of the sun's energy that runs this machine?

A. Ultraviolet.
B. Light.
C. Heat.
D. Potential.

C1. 105

Which of the following would NOT be a form of energy?

A. Sound. B. Lightning. C. Fog. D. Thunder.

C.5 106

Which of the following energy sources will be the most likely to outlast the other energy sources?

A. Solar heat.
B. Coal.
C. Petroleum.
D. Geothermal.

A.5 107

ELETROMAGNETIC RADIATION

Light, infra-red and x-rays are all part of the electro-magnetic spectrum. The property which all have in common is that all

A. can be sensed by man.
B. move at the same speed.
C. have the same frequency.
B1 D. are harmful to man. 108

All electro-magnetic waves travel at the speed of light. The speed of light is closest to

A. 330 $m.s^{-1}$ C. 186 000 $m.s^{-1}$
D3 B. 3000 m.s D. 300 000 m.s 109

110

Of the following, the one that cannot travel through a vacuum is

D3 A. heat. B. light. C. radio waves D. sound.

Photographic film is sensitive to which of the following pairs of waves?

A. Light waves and radio waves.
B. Light waves and x-rays.
C. Radio waves and television waves.
B5 D. Television waves and x-rays. 111

When the skin absorbs infra-red radiation, it usually

A. becomes hot.
B. develops a tan.
C. might develop cancer.
A2 D. loses pigmentation. 112

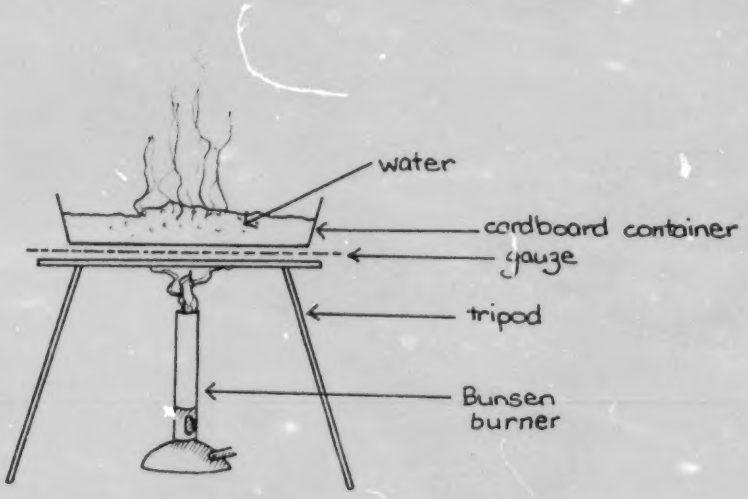
Which of the following wave types is most similar to a radio wave?

A. earthquake. C. sound.
B1 B. light. D. water. 113

The fact that we can send radio messages around the Earth depends upon

A. reflection from the ozone layer in the upper atmosphere.
B. internal reflection where the atmosphere meets outer space.
C. reflection from the ionosphere in the upper atmosphere.
C1 D. artificial satellites orbiting the Earth. 114

A student set up the apparatus shown below. He lit the Bunsen burner and noticed that the cardboard container did not ignite.

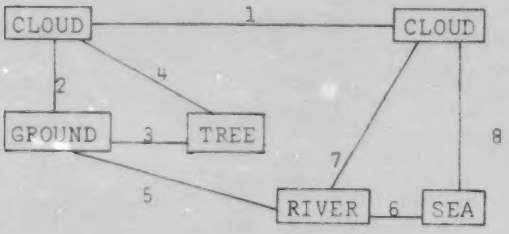


Which statement best explains why the cardboard does not ignite?

A. Gauze conducts the heat away from the cardboard.
B. The water puts out any fire before it starts.
C. Asbestos in the gauze keeps the cardboard cool.
D. Water stops the temperature rising above 100°C.

D1. 115

The following simplified diagram shows how water is cycled in nature. Lines represent movement of water.

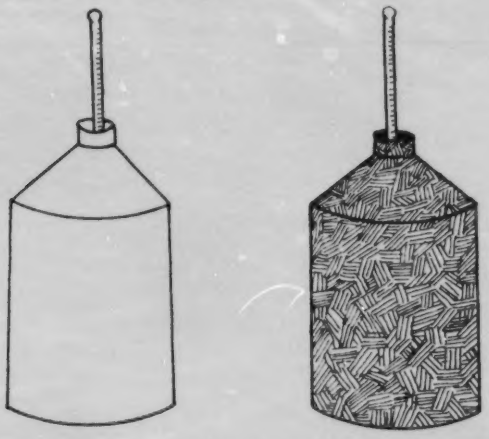


Evaporation could be represented by which lines on the diagram?

A. 1, 2, 6 and 8.
B. 2, 4, 7 and 8.
C. 3, 4, 5 and 8.
D. 4, 5, 7 and 8.

B3. 116

The next question refers to this diagram.



The diagram shows two empty cans which are identical in every way except that one is painted white whilst the other is painted black. Each can contains a thermometer. If they were placed outside in the sun, you would expect the

A. black one to heat up faster because black surfaces absorb all the colours of the spectrum.
B. black one to heat up slower because black absorbs none of the colours of the spectrum.
C. white one to heat up faster because the colour white contains all the colours of the spectrum.
D. white one to heat up slower because the colour white absorbs all the colours of the spectrum.

A5. 117

The table gives the amount of heat energy, in joules, required to change the temperature of a given mass of water by a given amount.

mass of water (g)	*temp change (C°)* 10	15
50	2100 J	3150 J
200	8400 J	x J

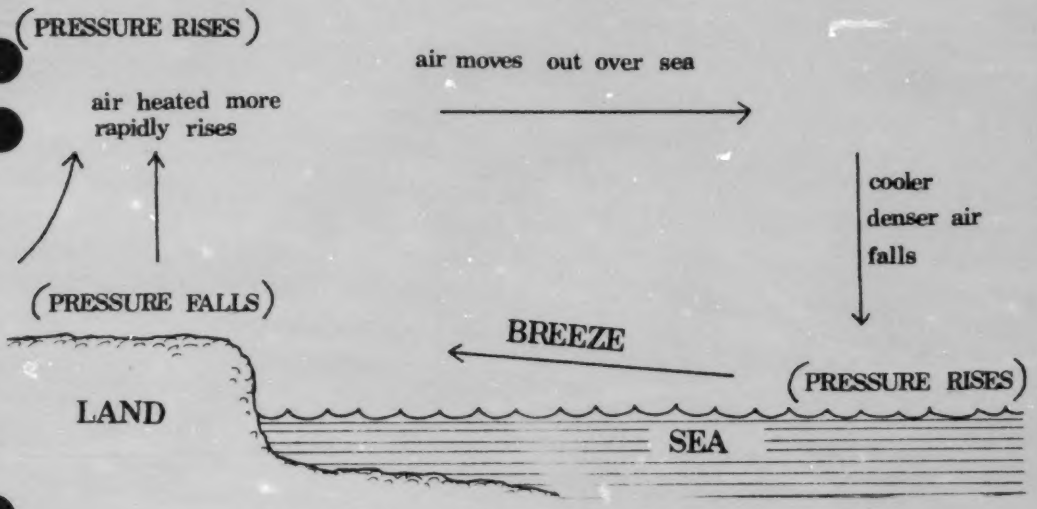
e.g. 50 g of water requires 2100 J of heat energy to be raised through 10 C°.

Which of the following values is equivalent to x?

A. 5 250 B. 10 500 C. 12 600 D. 16 800

C.3 118

The next question refers to this diagram.



This diagram indicates the formation of a

A. land breeze on a summer afternoon.
B. convection cell on a summer morning.
C. sea breeze on a summer afternoon.
D. conduction cell on a summer morning.

C4. 119

Which one of the following statements about heat transfer is correct?

A. Convection is the process of heat transfer through liquids only.
B. Conduction is the process of heat transfer through metals only.
C. Conduction occurs through the transfer of the material itself.
D. Radiation requires no material medium for the transfer of heat.

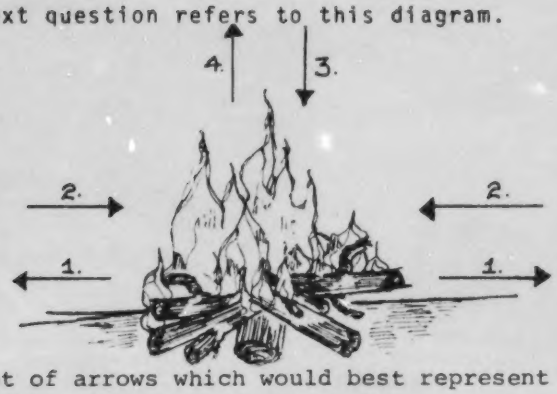
D1. 120

Heat reaches the Earth from the Sun by

A. conduction.
B. convection.
C. expansion.
D. radiation.

D5 121

The next question refers to this diagram.



The set of arrows which would best represent the movement of air about the fire would be

A. 1 and 3.
B. 2 and 4.
C. 1 and 4.
D. 2 and 3.

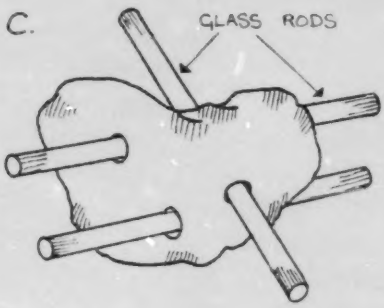
B3.

122

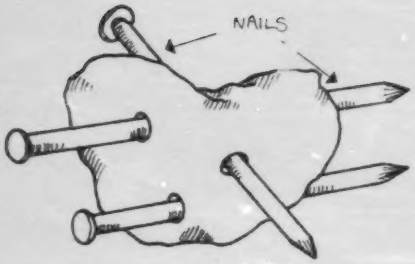
If the potatoes drawn below were each placed in the same oven, which would cook first - assume all potatoes are identical in shape, size and mass.

A.

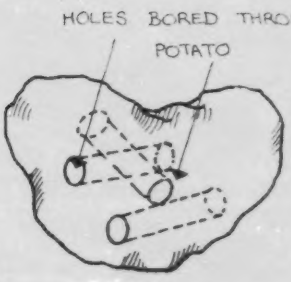
C.



B.



D.



B2.

12

A beaker of water is sitting on a tripod. It is being heated by a bunsen burner. The bunsen obviously heats the water at the bottom of the beaker, but the water at the top of the beaker also becomes hot. This is due to

A. conduction.
B. convection.
C. expansion.
D. radiation.

B2 124

Convection currents appear in

A. solids and liquids.
B. solids and gases.
C. liquids and gases.
D. solids, liquids and gases.

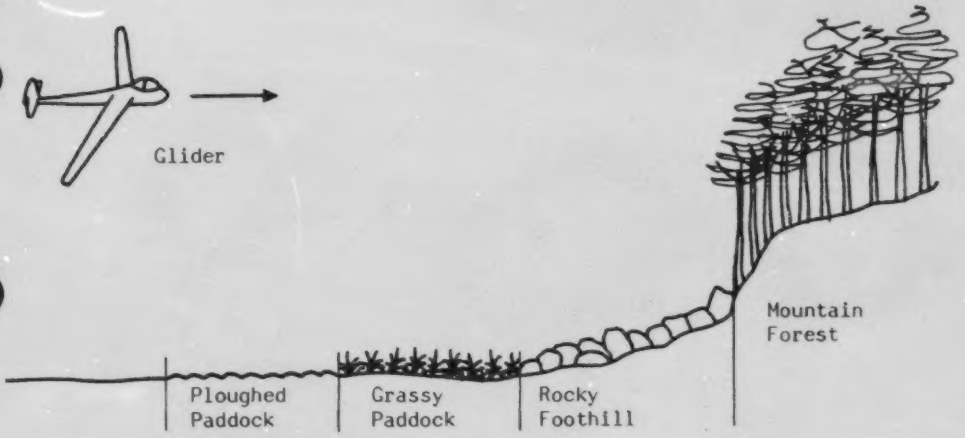
C2 125

Which of the following is NOT directly caused by convection currents?

A. Ocean currents.
B. Smoke rising from a fire.
C. Warmth from the sun.
D. Winds.

C1 126

The diagram below shows a glider in search of an upcurrent of air.
Over which surface is the glider most likely to find an upcurrent?



A. Ploughed paddock.
B. Grassy paddock.
C. Rocky foothill.
D. Mountain forest.

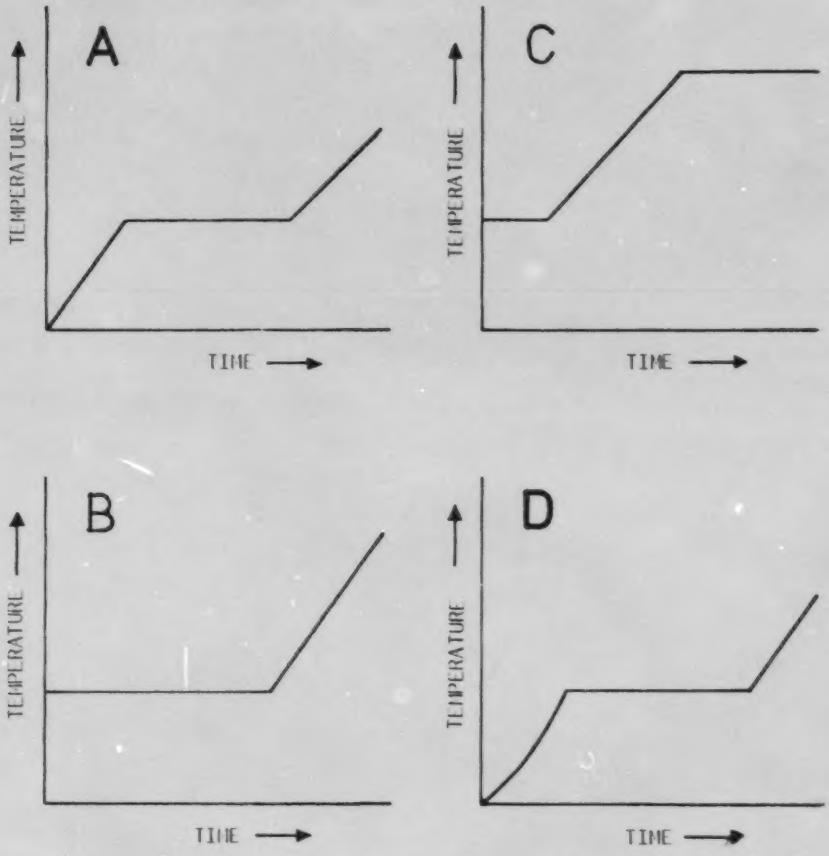
C2 127

A piece of metal feels colder than a piece of plastic at the same temperature. This is because

A. metal is a good conductor.
B. plastic absorbs heat more quickly.
C. metals radiate heat.
D. plastics manufacture heat.

A1 128

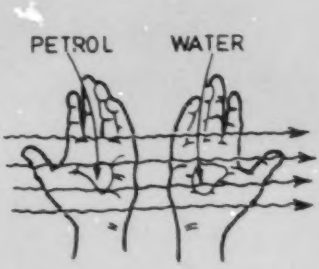
When ice is heated it melts and its temperature stays the same until all the ice has melted. After that, the temperature of the water increases until the water boils. While the water boils, the temperature remains the same until it has all changed to steam.
Which of the following graphs represents the temperature as the ice is heated until it has all changed to steam?



C3

129

Suppose you poured a few drops of petrol onto one hand and a few drops of water onto the other. If you held both hands in the breeze, the petrol would probably feel much colder than the water.

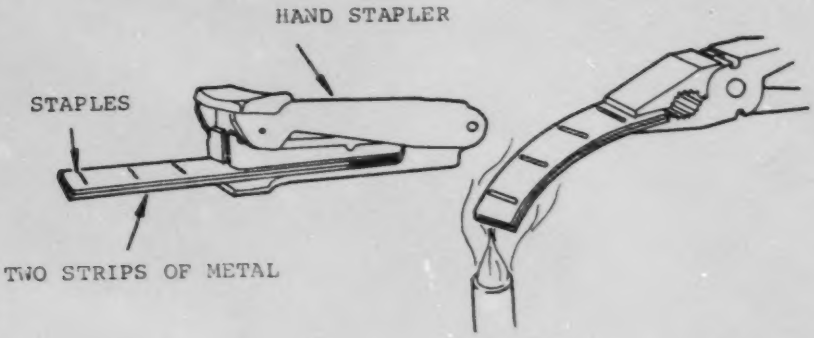


This is because petrol

A. is less dense than water.
B. is always a colder liquid than water.
C. soaks into the skin faster than water.
D. evaporates faster than water.

130

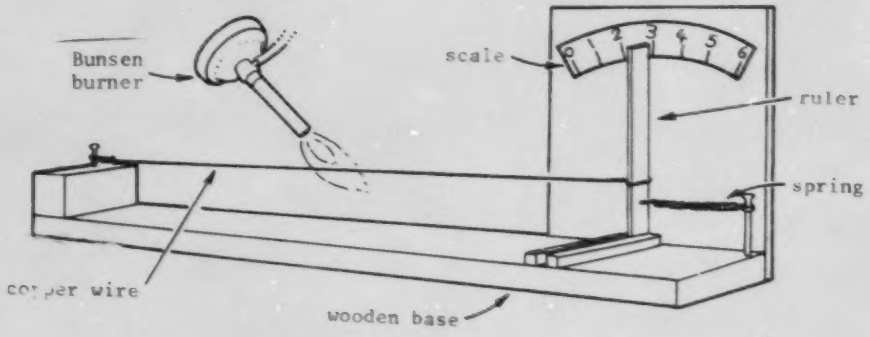
Two strips, each of different metal were stapled together as shown below.



When heated in the bunsen flame, the stapled strips bent downwards. From this observation you could say that

A. the top strip expanded more than the lower strip.
B. the lower strip expanded more than the top strip.
C. both strips expanded the same amount.
A1 D. the strips expanded but the staples did not. 131

The next question refers to the diagram below.



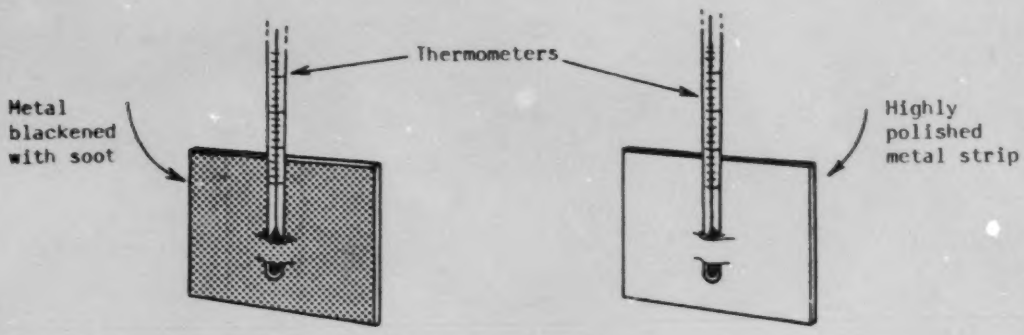
When heated the copper wire expands at a faster rate than iron wire heated the same amount.

When the copper wire in the apparatus above was heated, the ruler moved from 0 to 5 on the scale.

If the copper wire were replaced by an equal length of iron wire and heated the same amount, the ruler would

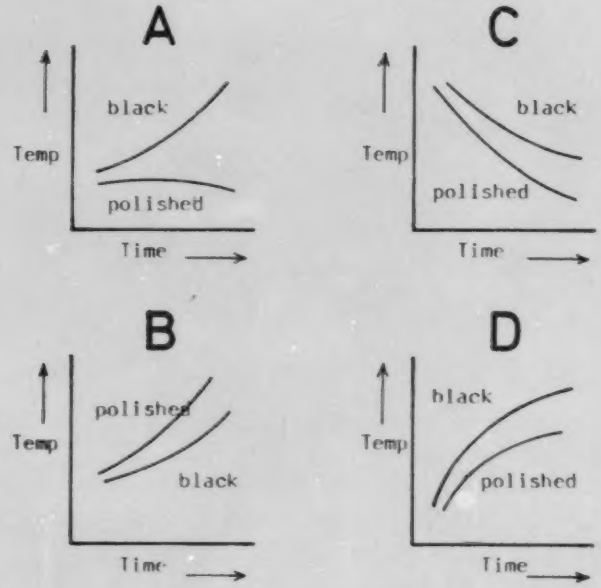
A. not move at all.
B. move from 0 to a number less than 5.
C. move from 0 to 5.
B3 D. move from 0 to a number greater than 5. 132

Two identical thermometers were fitted with metal strips as shown below. One of the strips was left highly polished while the other was blackened with soot.



Both thermometers were then set up exactly 3 inches to the side of a bunsen flame. They were arranged so that the face of each metal strip was directed toward the flame. The temperature shown by each thermometer was recorded every minute for 10 minutes.

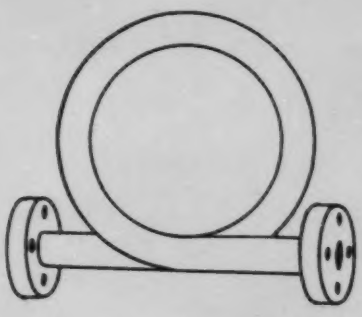
Which of the following graphs would best fit the temperatures recorded?

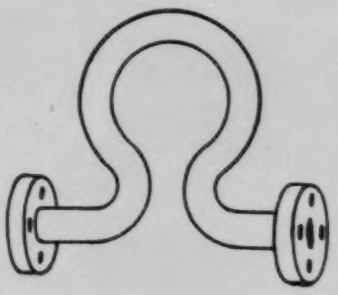


D1

HEAT

Iron pipes for carrying hot water or steam are sometimes fitted with bends shaped like the following diagrams.



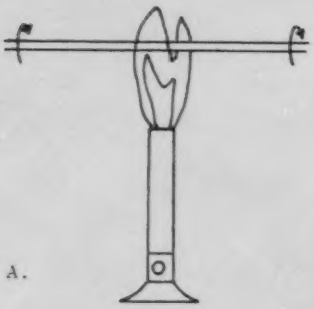


These bends are used to

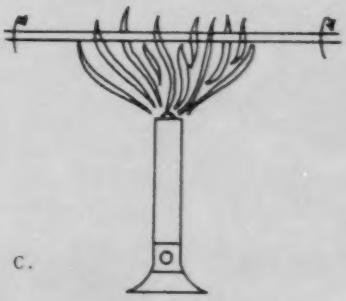
A. prevent steam from collecting in the pipes.
B. allow for expansion of the pipes.
C. prevent cracking so common with right angled bends.
B2 D. they allow use of extra pipes which give strength to the bends.

134

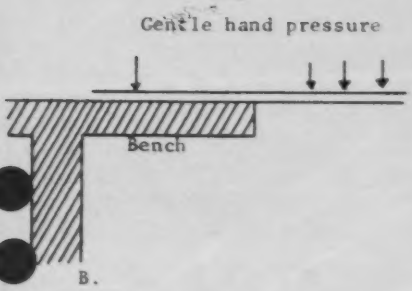
Which of the following methods would be the most suitable and safe for bending a glass tube?



A.



C.



B.

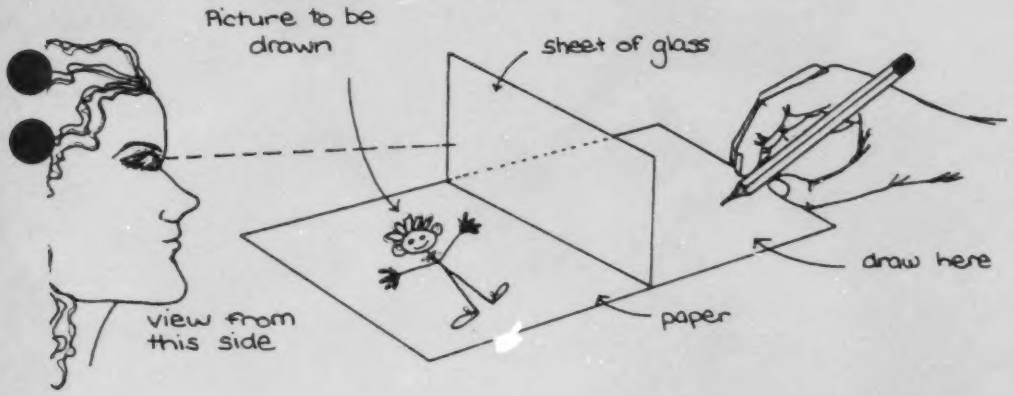
D.

C1

135

LIGHT AND OPTICS

A picture can be "traced" using the apparatus shown below.

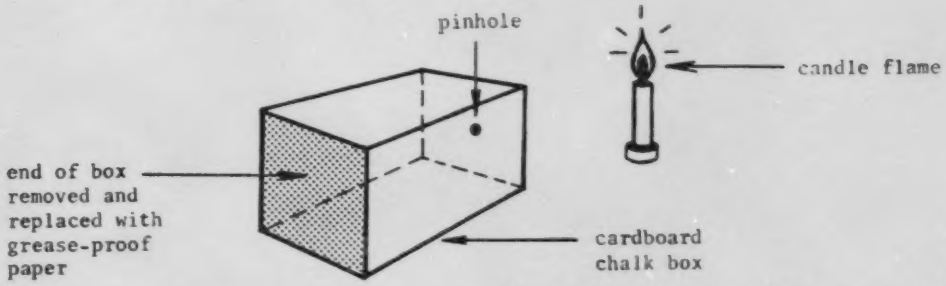


The "tracing" drawn by this method will be different from the original drawing as it will be

A. smaller.
B. larger.
C. up-side-down.
D. back-to-front.

D3. 136

The next question refers to this diagram:



A boy set up a chalk box as shown in this diagram. When he looks at the outside of the greaseproof paper, in a dimly lit room, he will see:

A. an image of the candle upside down
B. nothing because there is no lens in the box
C. an image of the candle the right way up
D. whatever there is in the room beyond the candle

A3. 137

A man stands facing a mirror with a wall directly behind him. The wall is 6 m from the mirror, and the man is 3 m from the mirror. The image of the wall seen in the mirror by the man appears to be at a distance from him of

C1 A. 4 m. B. 6 m. C. 8 m. D. 12 m. 138

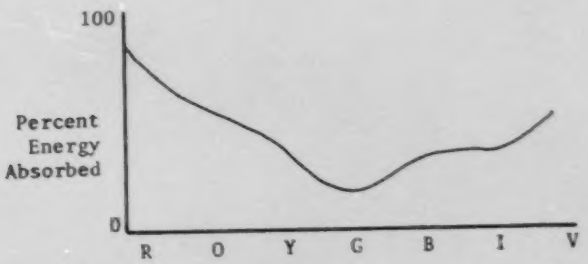
When a camera is used to take a picture, the lens at the front of the camera casts an image of the subject onto the film at the back of the camera. The best description of this image is

	Size Compared With Subject	Which Way Up	Colour or Black/White
A.	Larger	Right Way Up	Black/White
B.	Smaller	Upside Down	Full Colour
C.	Larger	Upside Down	Black/White
D.	Smaller	Right Way Up	Full Colour

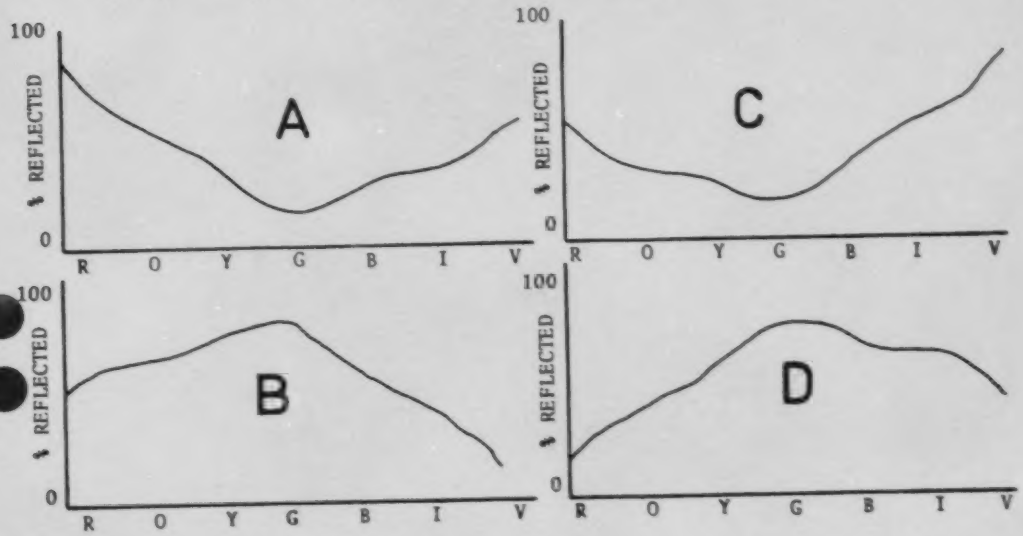
B.3

139

The graph below shows the percentage of radiant energy absorbed by the various colours in the spectrum, as painted on squares of cardboard.



Which graph (below) shows the radiant energy reflected by the same colours on the same cards.

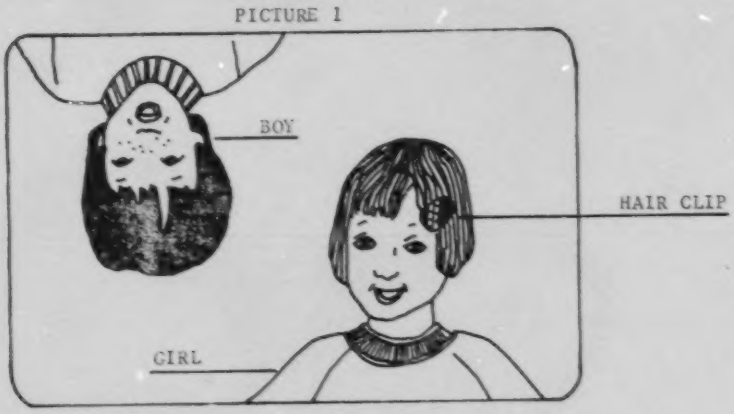


140

D3.

A boy and a girl appeared in a television interview. Picture 1 below shows how the boy and girl appeared during the interview. During the interview the girl's hair clip became loose and Picture 2 shows what the viewers saw happening to the hair clip.

PICTURE 1



PICTURE 2

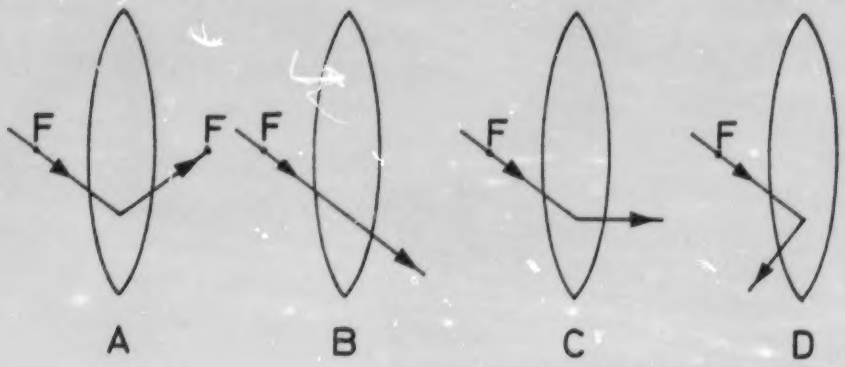
Which of the following is the most likely explanation for what the viewers saw?

A. In the studio there is a machine that makes things go up.
B. The television picture and the girl are really upside down.
C. The boy is really in England on the other side of the Earth.
D. The boy is hanging upside down from a trapeze. 141

A needle was placed 20 cm from a plane mirror. The mirror was moved 5.0 cm towards the needle. What was the final distance between the needle and its image?

A. 25 cm. B. 30 cm. C. 35 cm. D. 40 cm.

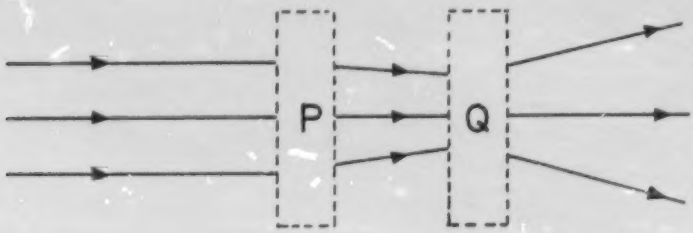
Which diagram is correct? (F = focal point)



C1

143

The next question refers to the following diagram showing rays of light travelling towards two objects, P and Q.



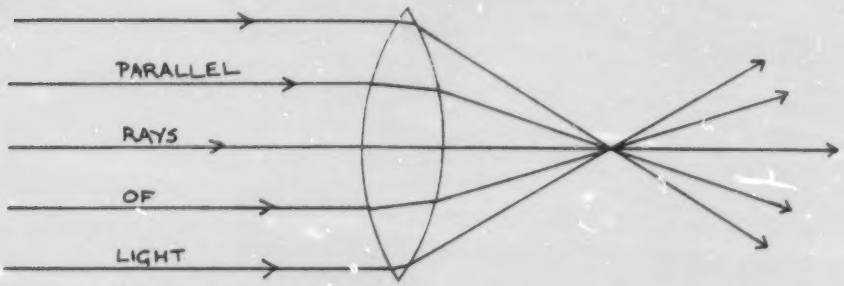
Which statement is correct?

A. P is a convex lens of shorter focal length.
   Q is a concave lens of longer focal length.
B. P is a convex lens of longer focal length.
   Q is a concave lens of shorter focal length.
C. P is a concave lens of shorter focal length.
   Q is a convex lens of longer focal length.
D. P is a concave lens of longer focal length.
   Q is a convex lens of shorter focal length.

B1

144

The next question refers to this diagram.



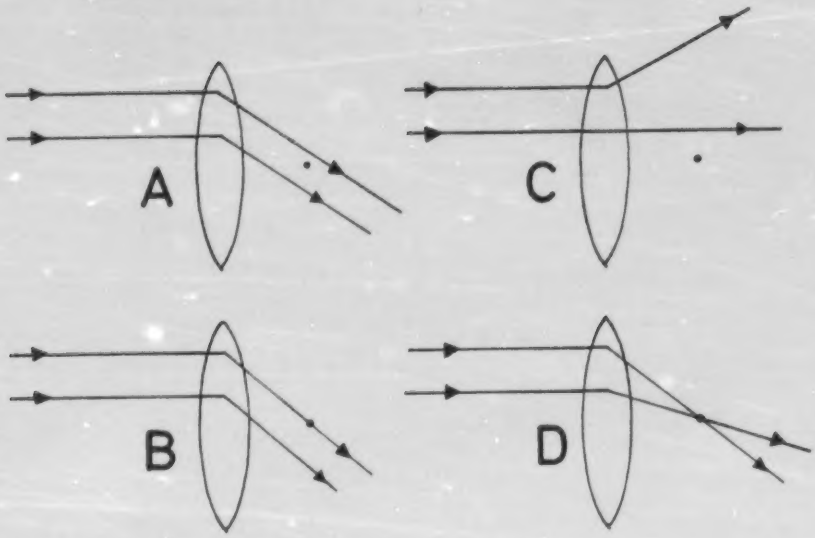
The focal length of the lens drawn above in millimetres, is nearest to

A. 10 B. 20 C. 40 D. 60

C3.

145

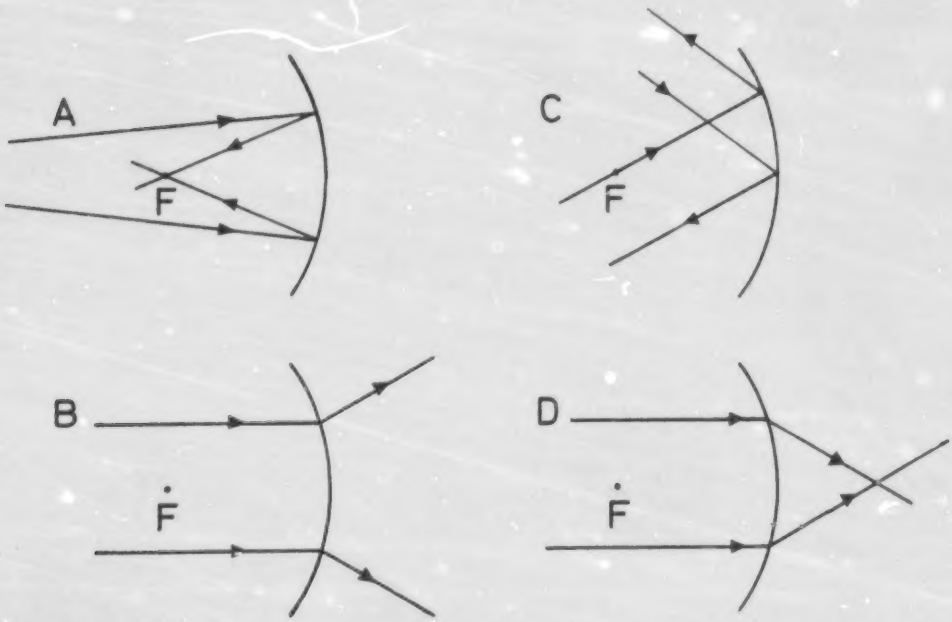
Which diagram is correct? • = Focal point.



D5

146

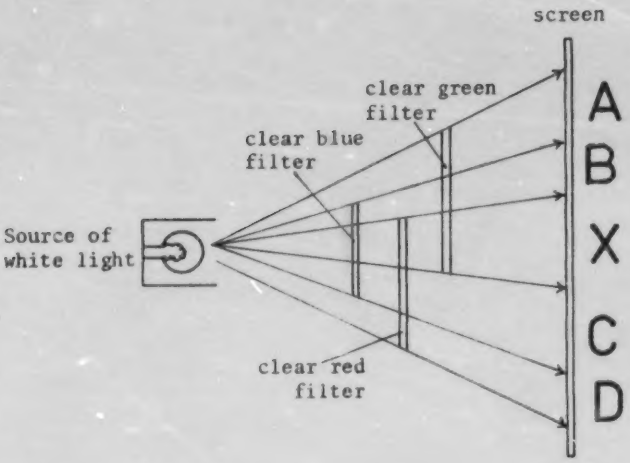
The next question refers to the diagrams showing rays of light hitting a concave mirror. The focus of the mirror is marked "F". Which diagram is correct?



A2

147

The next two questions refer to this diagram.



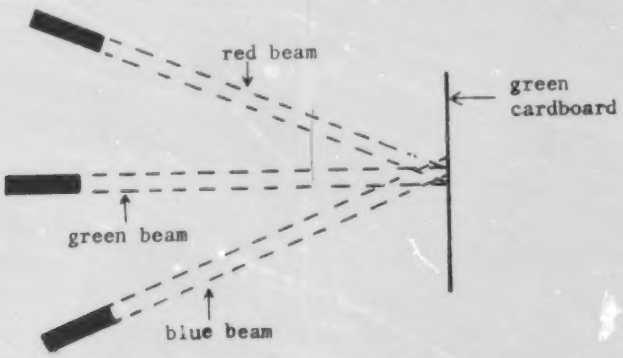
Light from the source shines through various filters and then hits the white screen.

A4 Given that part of the screen appears green, which section, A,B,C, or D, would this be? 148

What colour would you expect the centre of the screen, marked "X" to be?

A. Black.
B. Deep purple.
C. Greeny-yellow.
A1 D. White. 149

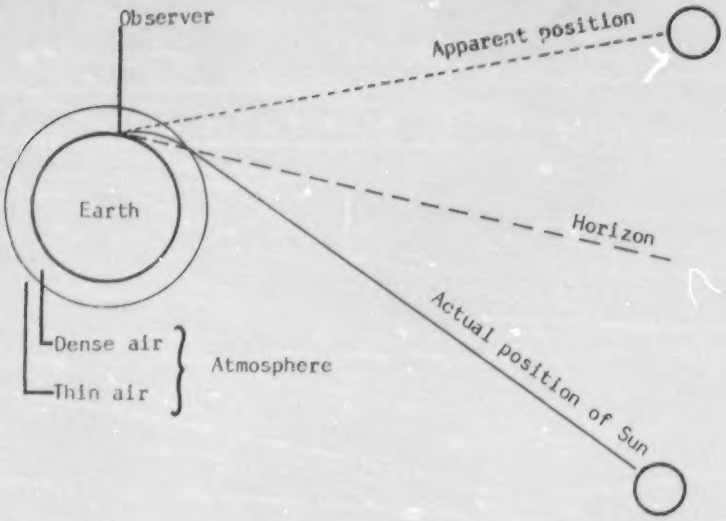
The next question refers to this diagram.



In the experiment shown above, beams of red, green and blue light were shone onto a piece of green cardboard. The cardboard would appear

A. red. B. green. C. blue. D. white. 150

B2.



At sunset, we can see the sun even though it is below the horizon. From the information in the diagram above, this happens because

A. the rays of light from the sun are bent towards the horizon.
B. the rays of light from the sun are bent away from the horizon.
C. the rays of light from the sun are magnified by the atmosphere.
A3 D. the rays of light from the sun are magnified by the thin air.

151

When you stand on the bank of a clear creek and look through the water to the bottom, the water appears shallower than it really is. This is best explained by the fact that

A. light from the bottom of the creek is bent through an angle at the surface of the water.
B. some of the light from the sun is reflected at the surface of the water.
C. running water absorbs some of the light's energy before it reaches your eye.
A3 D. the rippling surface of the water scatters the light in all directions.

152

Consider the following facts:

1. Chocolate ice-cream melts faster than vanilla ice-cream.
2. Birds fluff out their feathers in cold weather.
3. Climbers on Mt. Everest must cook food in pressure cookers.
4. Many petrol tankers are white in colour.

Which two facts are due to the same scientific fact?

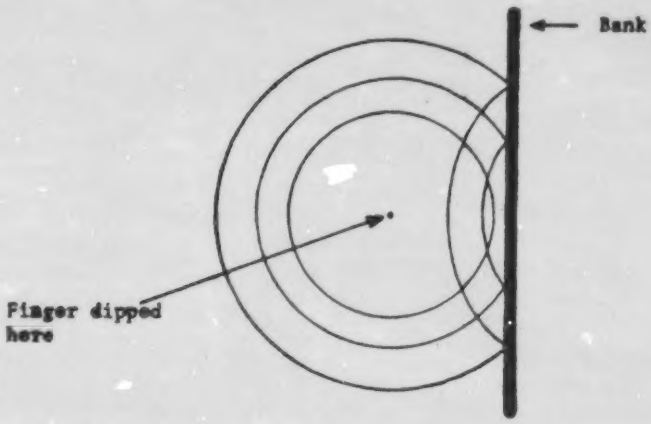
A. 1 and 2. C. 2 and 3.
B. 1 and 4. D. 3 and 4.

153

When light passes from one substance to another it bends. This is called refraction. This fact helps us to understand why

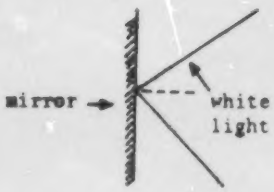
A. periscopes allow us to see objects normally out of sight.
B. a colour T.V. has only three colours of dots on its screen.
C. a fish is not actually where it appears to be in water.

While bushwalking a boy comes across a small still pool. The boy dips his finger in and out of the pool. The pattern of waves produced is shown below.

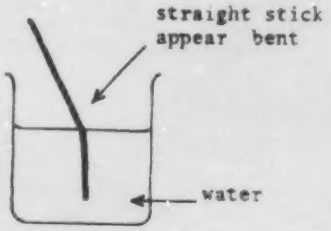


Of the diagrams below, the one which shows light behaving in a similar way to the water when it hits the bank is

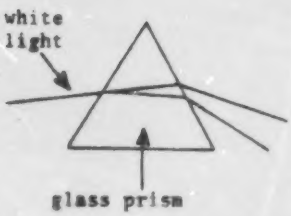
A



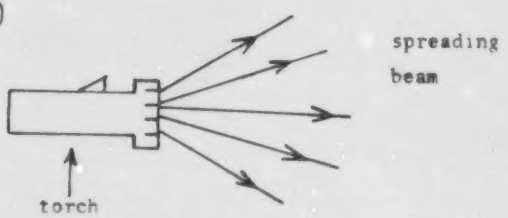
C



B

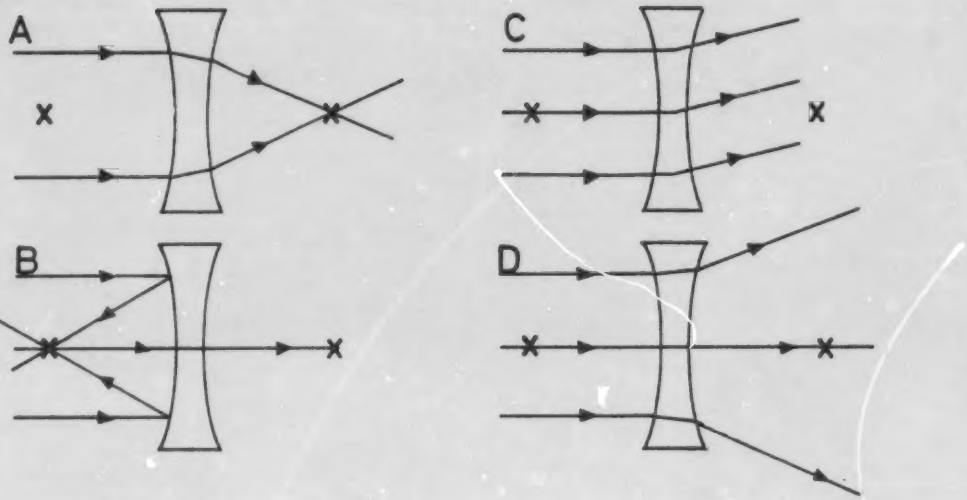


D



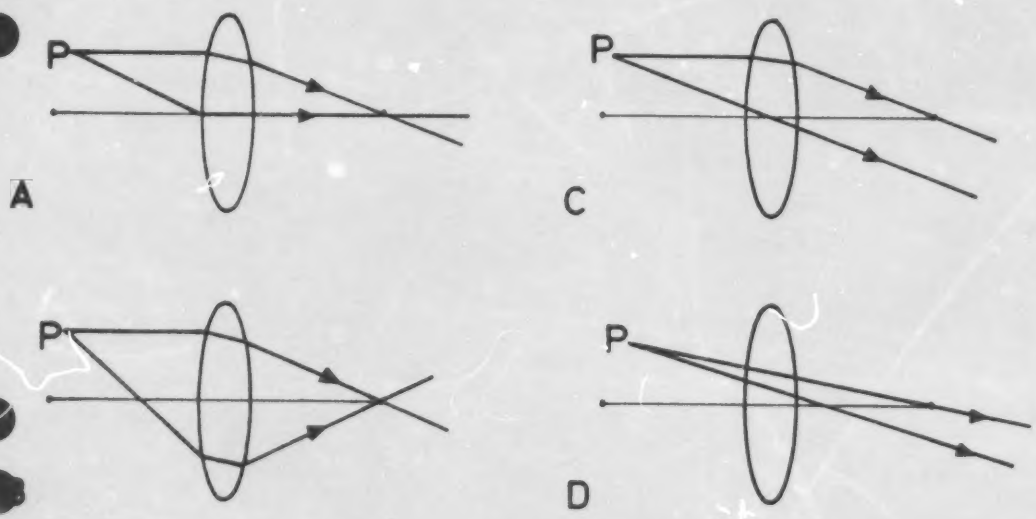
The next question refers to the following diagrams of double concave lenses. Their foci are marked as "X".

Which diagram below is correct?



156

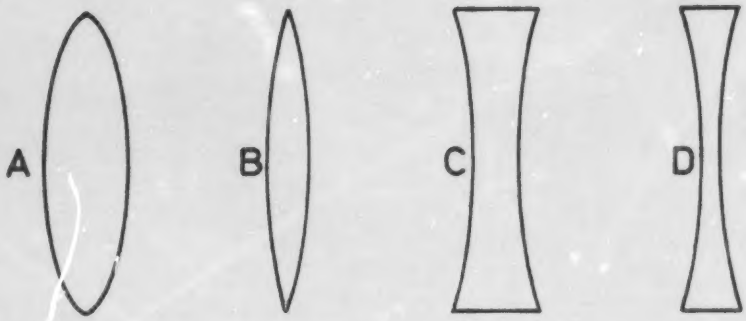
Which diagram correctly represents the paths taken by the rays of light from point P through the lens?



C1

157

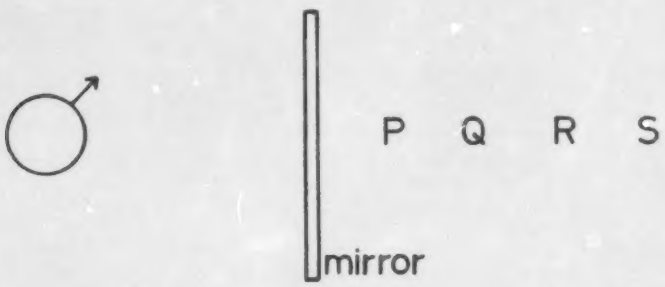
Which lens drawn below would give the greatest magnification?



158

The next two questions refer to the following information.

An object ♂ is placed in front of a mirror as shown:-

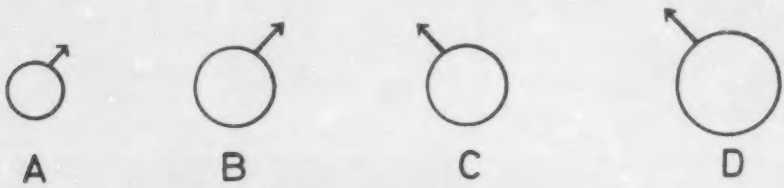


The image of the object would be formed at point

C3 A. P B. Q C. R D. S

159

The image formed would most resemble



160

C4

A boy's name is John Smith. If he prints his name so that when viewed in a mirror placed behind the words, it appears

A. LOHN SMITH

B. ꞱOHИ SMIꞱH

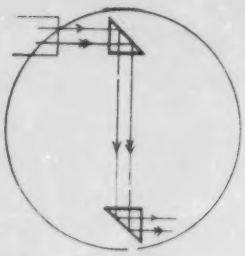
C. ꞱOHИ SWIꞱH

D. LOHN SWITH

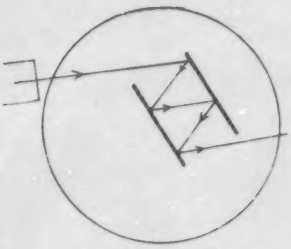
C3

161

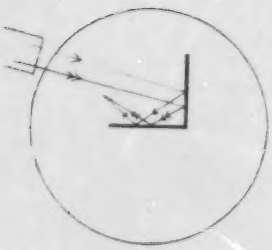
Which of the ray diagrams below demonstrates the principle of the periscope?



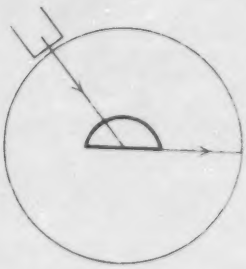
A



C



B



D

A4

162

Which of the following parts of the camera regulates the time during which light may enter the camera?

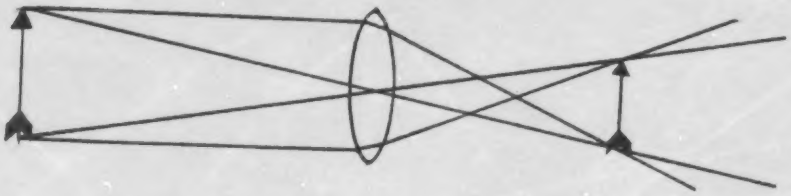
A. Aperture.
B. Shutter.
C. Lens.
D. Diaphragm.

B3

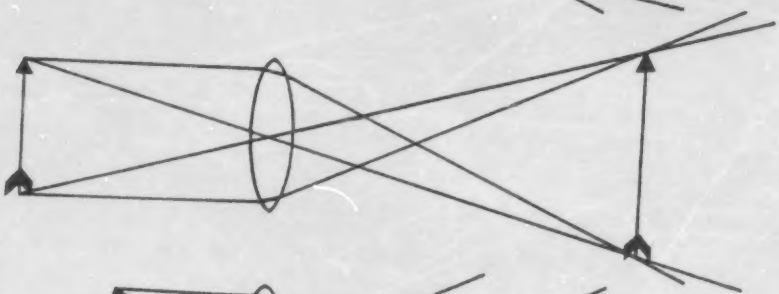
163

Which lens system below best resembles the action of the lens in your eye?

A

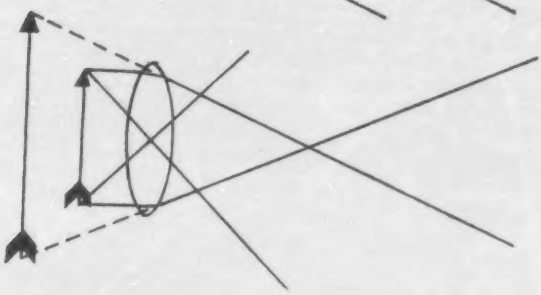


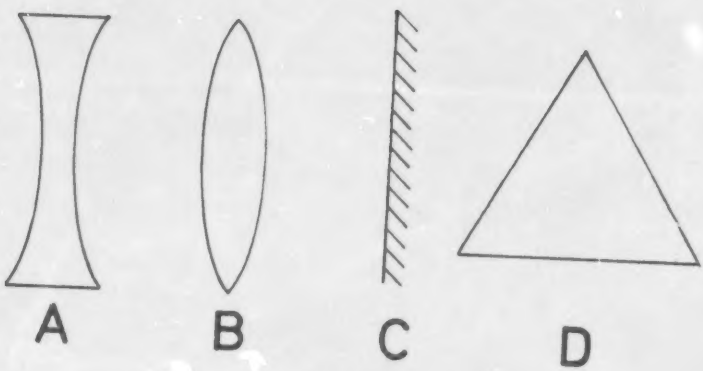
B



C

D



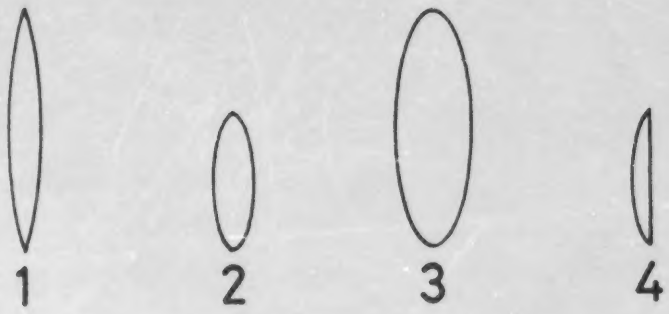


Which of the above could be used to obtain a real image on a screen of an object in the distance?

B2

A. Concave lens.
B. Convex lens.
C. Plane mirror.
D. Triangular glass prism.

The next four questions refer to the four lenses which are shown below.



Which lens has the greatest focal length?

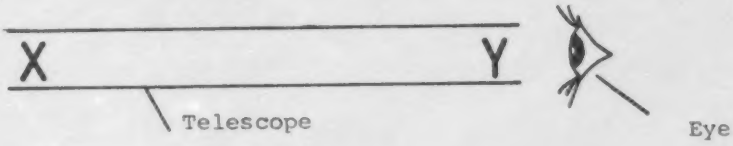
D1 A. 1 B. 2 C. 3 D. 4 166

Which lens has the smallest focal length?

C1 A. 1 B. 2 C. 3 D. 4 167

Which lens would be the most powerful magnifying glass?

C3 A. 1 B. 2 C. 3 D. 4 168



The most powerful telescope would be made by placing

A. lens 1 at X and lens 3 at Y.
B. lens 1 at X and lens 4 at Y.
C. lens 1 at Y and lens 4 at X.
A1 D. lens 1 at Y and lens 3 at X. 169

The image seen in a simple magnifying glass is

A. real.
B. virtual and upright.
C. virtual and diminished.
B1 D. virtual and inverted. 170

SOUND

Sound waves cannot travel through

A5
A. a vacuum.
B. air.
C. steel.
D. wood.
171

A soprano sings a different note to that of a baritone. The difference between the two sounds produced is the result of

B3
A. amplitude.
B. frequency.
C. intensity.
D. velocity.
172

From a distance the sound of a cricket ball hitting a bat seems to be out of step with the actual event. This is because

A5
A. light travels faster than sound.
B. the speed of light is affected by temperature.
C. sound is produced after the event.
D. the speed of sound depends on how it is produced.
173

A tuning fork which gives the middle note C vibrates 256 times per second. A tuning fork which vibrates 284 times per second would produce a note which was

D5
A. louder in amplitude.
B. softer in amplitude.
C. lower in pitch.
D. higher in pitch.
174

The speed of sound in air at sea level is closest to

B3
A. 0.1 m/s.
B. 330 metres per second.
C. 300 km/hr.
D. 300 000 000 m/s.
175

Two tuning forks emit sounds alongside each other. An observer hears a regular beat every ½ second. This indicates that the

A1
A. pitch of the sound from the two forks is almost the same but not quite identical.
B. two forks emit sounds of very different frequency.
C. two forks have the same frequency.
D. velocity of the sound differs slightly for each fork.
176

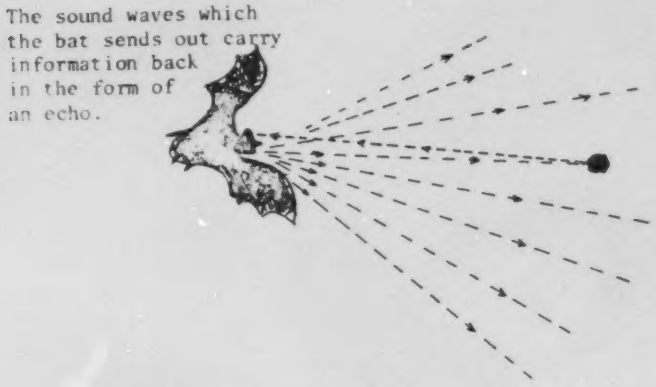
The loudness of a sound is measured in

B5
A. amps.
B. decibels.
C. lumens.
D. hertz.
177

A sound is heard when the

D3
A. sound waves reach the eardrum.
B. bones of the ear begin to vibrate.
C. fluid in the cochlea begins to vibrate.
D. message from the nerves reaches the brain.
178

A bat can safely fly through a forest of trees even in complete darkness. This diagram shows how it can do this:-



The property that sound waves (and all other waves) have which allows the bat to use them as a guide is that waves

A. bend when slowed down.
B. bounce off surfaces at the same angle that they strike them.
C. travel faster in some substances than in others.
D. pass right through some substances.

B4. 179

Which of the following instruments would be the most useful for detecting a longitudinal progressive wave?

A. Gramophone.
B. Microphone.
C. Spectroscope.
D. Television camera.

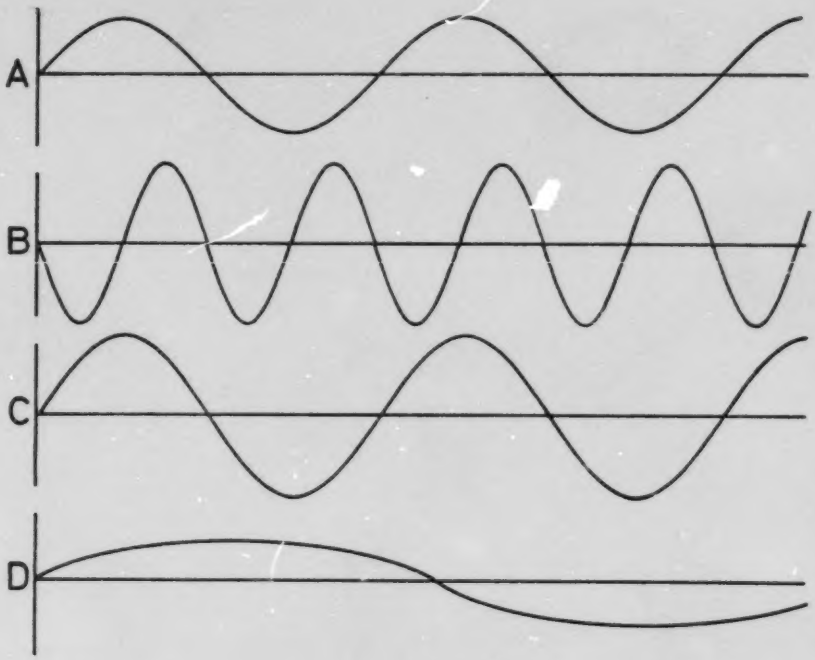
B1 180

Imagine you are looking at two diagrams of two sound waves. The two sounds are exactly the same, except that one is louder than the other. The louder wave would have a larger

A. amplitude.
B. frequency.
C. speed of vibration.
D. wave length.

A2. 181

Look at the diagrams representing sound waves below. Which of these diagrams shows the wave with the greatest pitch assuming the diagrams are all drawn to the same scale?



B5 182

Distortion of a sound in a large auditorium or theatre results from

A. reflection of sound.
B. decrease in the amplitude of the sound waves.
C. refraction of sound by hot and cold layers of air
D. rapid absorption of sound by curtains and walls.

A4 183

The speed of sound in air is 320 metres per second. The sound from a tuning fork has a frequency of 160 cycles per second. What is the wavelength of this sound in air?

A. ½ metre.
B. 1 metre.
C. 2 metres.
D. 10 metres.

C3 184

Sound waves are in many ways similar to light waves. They differ, however, in two important ways. Sound waves travel

A. slower and are longitudinal waves.
B. faster and are longitudinal waves.
C. slower and are transverse waves.
D. faster and are transverse waves.

185

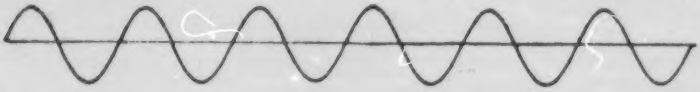
A sonar impulse is transmitted vertically downward from a boat and the signal reflected from the sea bed is received on board after a 10 second interval. Given that the speed of sound in water is 1450 metres per second, how deep is the water in this part of the ocean?

A. 725 metres.
B. 1450 metres.
C. 7250 metres.
D. 14500 metres.

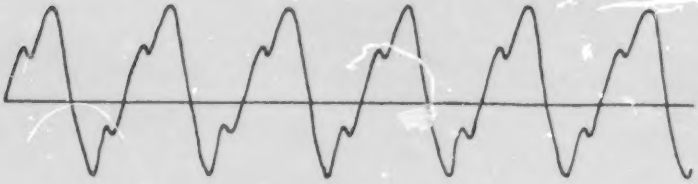
C1 186

Which of the wave patterns below represents a pure note?

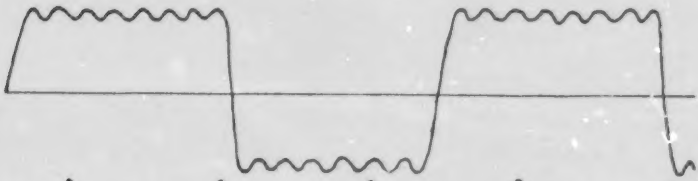
A.



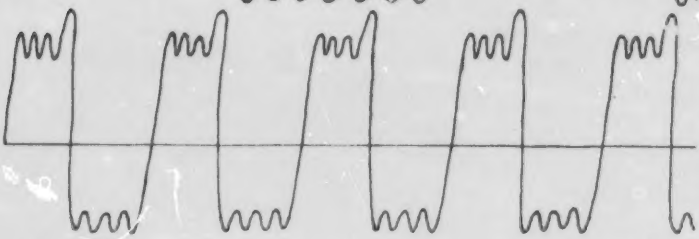
B.



C.

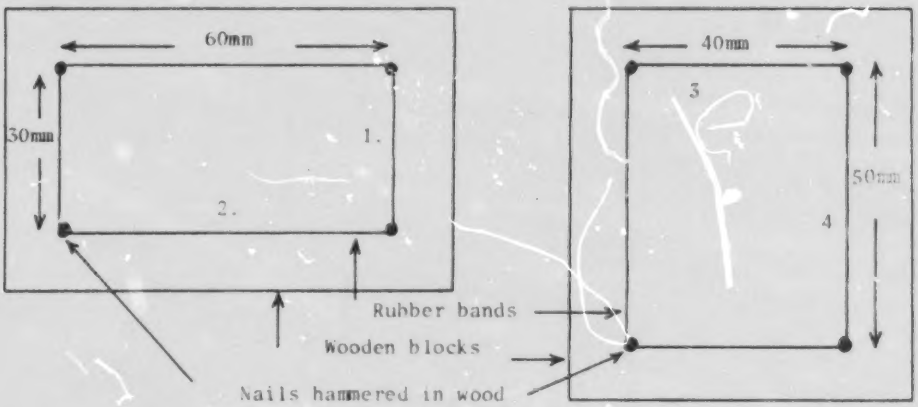


D.



187

Two identical rubber bands were stretched around two frames made from blocks of wood and nails as shown.



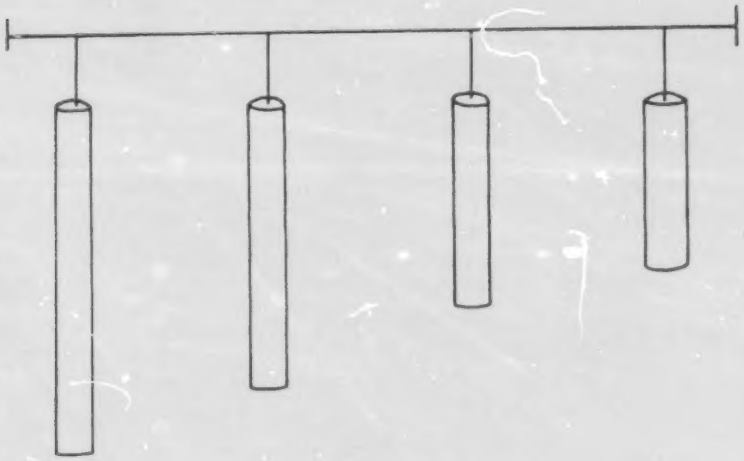
When plucked at points 1,2,3, and 4 it was found that point 1 produced the 'highest' note.
The conclusions one could make from this experiment is that the 'highness' of the note produced by a plucked rubber band depends on the

A. length of the rubber band between the nails.
B. thickness of the rubber band.
C. tension of the rubber band.
D. frequency of the vibration.

A2

188

The following diagram shows four metal bars hanging from string.



When these bars are struck with a hammer, they emit different sounds (some high notes, some low notes). The best explanation for this difference is that

A. the bars are made from different types of metals.
B. the bars were struck at different points along their length.
C. the different bars vibrate at different rates.
D. some are struck hard and some are struck softly.

C.5

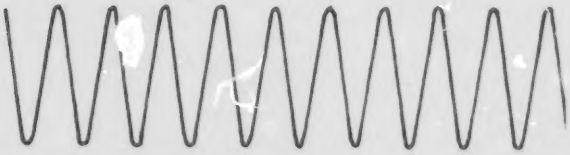
189

Which of the waves below has the highest amptitude and the highest frequency?

A.

B.

C.

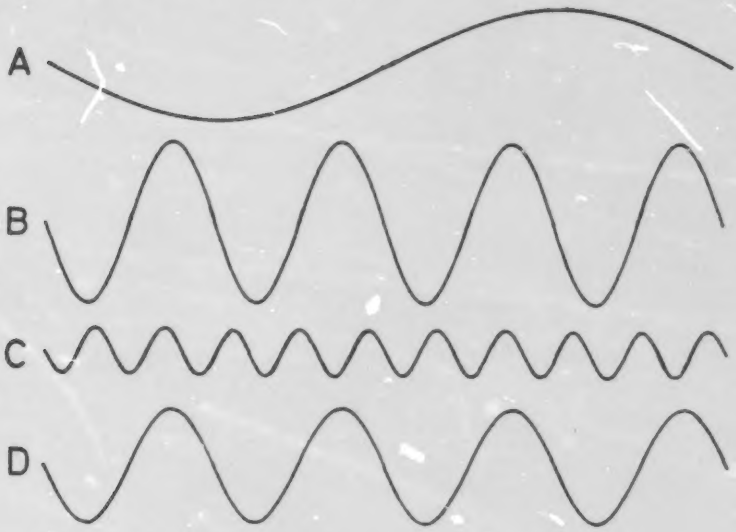


D.

C5

190

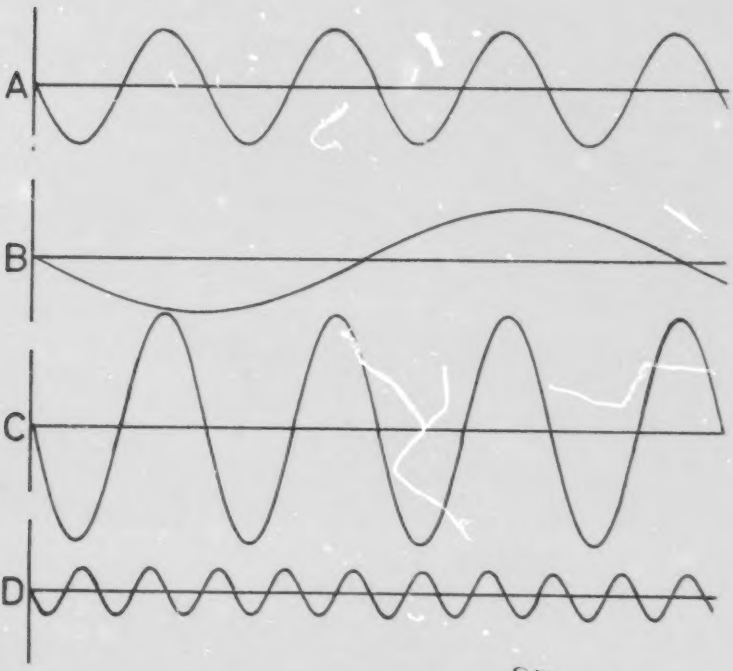
If each of the waves below has the same frequency, which would have the greatest velocity?



A1

191

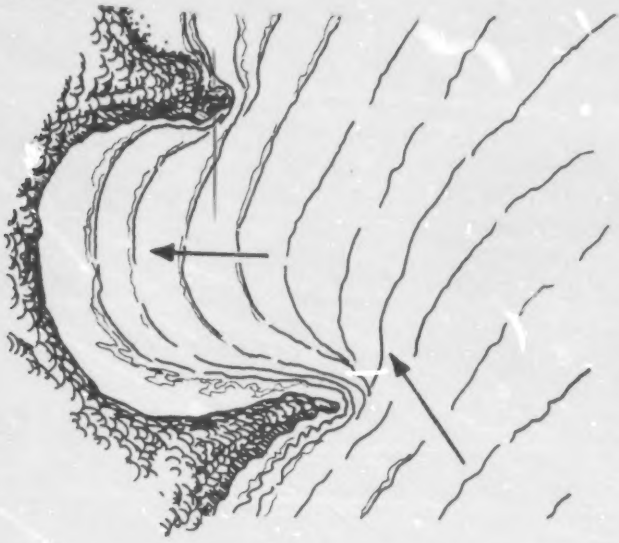
Which of the following waves in the diagrams below, all drawn to the same scale, has the greatest amplitude?



C5

192

The picture below shows a series of waves hitting a coastline.



The bending of the waves as they approach the coastline is due to

A. a change in the depth of the water.
B. a change in the direction of the wind.
C. the presence of a longshore current.
D. the presence of a sandbank in the middle of the inlet.

A.1

193

There are many ways in which energy can be sent from one place to another. Some of these are listed below in two groups:

GROUP 1	GROUP 2
Sound waves Earthquake waves	Radio waves Light waves

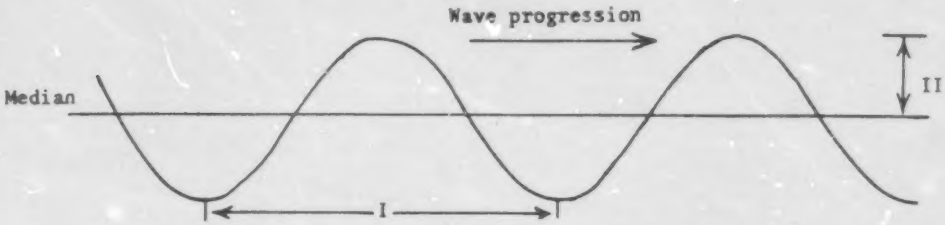
Which of the following statements about the behaviour of these waves is correct?

	GROUP 1	GROUP 2
A.	Can be detected by the human body.	Cannot be detected by the human body.
B.	Cannot carry energy through empty space.	Can carry energy through empty space.
C.	Can carry information as well as energy.	Cannot carry information as well as energy.
D.	Cannot be reflected or refracted.	Can be reflected and refracted.

B1.

194

The next two questions refer to the following information.
This diagram represents a transverse wave motion in a spring.



The measurement shown as I is the

A. displacement.
B. amplitude.
C. frequency.
D. wavelength.

D4. 195

The measurement shown as II is the

A. displacement.
B. amplitude.
C. frequency.
D. wavelength.

B3. 196

A boy throws a stone into a stationary lake. Which waves from this will reach him first?

A. Light reflected from the splash.
B. The sound of the splash.
C. Water waves caused by the stone.
D. Compression waves through the water.

A3. 197

COMMUNICATION

The ionosphere extends from about 80km to 500km above the surface of the earth. The lower level of the ionosphere is particularly useful to man because it

A. absorbs ultraviolet radiation.
B. reflects short wave radio signals.
C. deflects TV waves so that they bend around the Earth.
D. prevents oxygen escaping from near the Earth's surface.

198

One of the problems we have in using machines such as typewriters or teleprinters for communication, is that the person who types the message may make a mistake. Some messages are much more likely to have this problem than others.

Which of these messages do you think would be most difficult for the operator to type accurately on the machine?

A. BEST WISHES HAPPY BIRTHDAY LOVE ED
B. ARRIVING QANTAS FLIGHT 008 FRI ANN
C. JO 634792 OR 67525504 OR 147982 ROB
D. SYD AUST JUN JUL THEN MELB AUG SEP

199

C4.

Suppose you were asked to design a calendar to be distributed by an oil company to all its English-speaking customers all around the world. The calendar must be attractive, and it must contain some extra, useful information so that the customers will keep it and use it. You must choose information that will be true for every part of the world.

If you had to choose from the following list, it would be best to give information about the times of

A. high and low tides.
B. seasons and weather.
C. phases of the moon.
D. sunrise and sunset.

200

C2.

Which of the following methods of communication has the most effect on the life of a school pupil?

A. Newspapers and magazines.
B. Radio and television.
C. Telephones and telecommunications.
D. Postcards and letters.

B5.

201

Communication is studied as a part of your science course because

A. everyone needs to understand how televisions work.
B. radio plays a big part in controlling the movement of aeroplanes.
C. most people have their own transistor radios.
D. effective communications are an essential part of our society.

D5.

202

All the time, you are receiving information from your surroundings. How much of this information is brought to you by some kind of wave?

A. None at all.
B. Very little.
C. About half.
D. Almost all.

D4.

203

Much information we receive from our environment comes to us in the form of waves. Which of the following is an example of this?

A. Flavour of our food.
B. Odour of a flower.
C. Listening to a record.
D. Feeling a rough surface.

C4.

204

A scientist wishes to send a large quantity of information from a space capsule travelling through the Solar System back to scientists on Earth.
The most suitable means of transferring this information would be by

A. coaxial cable.
B. gamma radiation.
C. light messages.
D. radio signals.

D2.

205

Intercontinental communications reached its peak of development with the introduction of

A. intercontinental airmail.
B. oceanic telegraph cable.
C. satellite communication.
C4 D. wireless telegraphy. 20

Progress in communication has resulted from improvements in the speed of converting a message into code and transmitting it to the receiver where it is decoded. Which of the following methods would be most suitable for communication between two people situated 5km apart?

A. The beating of drums.
B. A loud hailer with language as code.
C. Morse code telegraphy.
C5 D. Smoke signals. 20

The best method of converting a sound to an electric current is by

A. vibrating a magnet in a coil of wire.
B. vibrating a column of air.
C. vibrating a beam of light in front of a lens.
A2 D. the compression of carbon particles. 20

"A pity I can't turn the television "Fast Forward" to skip the parts that bore me and zero in on what I want to see - even to hold it for detailed contemplation. Tape recorders, videotape, and films can be speeded and even reversed, but when you do want to follow a particular segment you must still accept the tempo of the tape or film."
Modern communication systems have many faults similar to those mentioned above. The faults described above are not present in

A. audiodisc (gramophone records).
B. verbal (person to person) communication.
C. videodisc communication (TV records).
D2 D. the written word (books). 20

Modern day communication between Australia and Europe is achieved most efficiently and quickly by

A. radio communication.
B. laser beam satellite communication.
C. microwave telegraphy.
B4 D. multimedia telegraphy. 21

Sunspot activity on the sun's surface results in effects on the earth causing changes in the earth's magnetic fields. The most serious immediate effect of this activity is

A. changes of weather.
B. disruption of communication.
C. difficulties in marine navigation by the sun.
A1 D. reduction of the effectiveness of solar heaters. 21

METEOROLOGY

During the day the sun's warmth evaporates water from the earth. During the cool night, the atmosphere becomes saturated with moisture. The most common result is

A3 A. dew. B. fog. C. frost. D. rain. 212

An air mass which contains a high proportion of water vapour is most likely to produce rain if it is moving

A. over a mountain range.
A2 B. towards a warm air mass.
C. inland from over the sea.
D. from land out to sea. 213

High altitude, white wispy clouds are best called

A. Cirrus.
A3 B. Cumulus.
C. Cumulo-nimbus.
D. Stratus. 214

Cirrus clouds are often a sign that a cold front is approaching. Cirrus clouds may be described as

A. dark rain clouds.
B. delicate, hair-like high clouds.
C. dense bulging clouds with sharp outlines.
B1 D. low clouds that cover most of the sky. 215

What kind of weather do nimbus clouds usually indicate?

A. Clearing storms or rain.
B. Hot humid weather to come.
C. Mild sunny days ahead.
D1 D. Storms or rains to come. 216

The weather of eastern New South Wales is mostly determined by

A. low and high pressure systems moving across Australia from west to east.
B. high pressure systems from the north-east.
C. high pressure systems from the north-west through central Australia.
A3 D. high pressure systems moving along the coast from north to south. 217

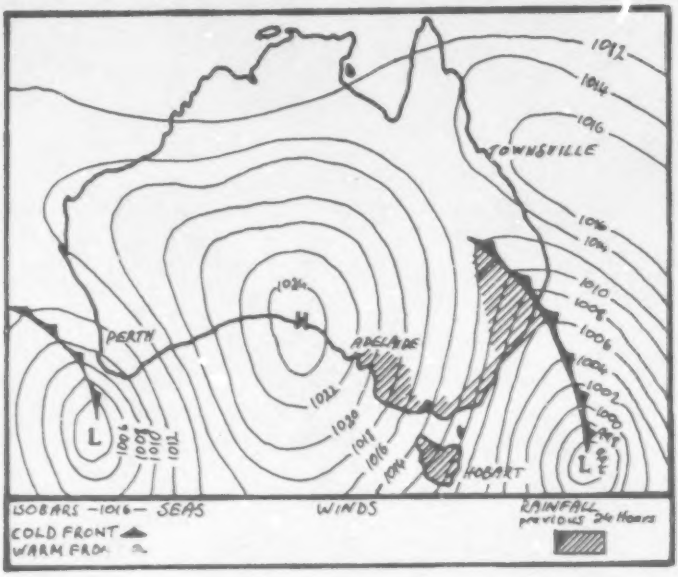
Which one of the following best describes a front?

A. An increase in the air temperature.
B. The layer of air between a cyclone and an anticyclone.
C. The boundary between a cold air mass and a warm air mass.
D. A cold wind blowing off the sea. 218

On a weather map, an isobar joins points which have equal

A. atmospheric pressure.
A3 B. average temperatures.
C. daily temperatures.
D. rainfalls. 219

The next question refers to this weather map.



Using the information shown on the weather map above which city will probably receive rain next?

A. Adelaide.
B. Hobart.
C. Perth.
D. Townsville.

C3.

220

The next question refers to the following information.

1. At the Earth's surface the average temperature may be 20°C.
2. At an altitude of 10 kilometres it is about 50°C below freezing.
3. At a height of 300 km the temperature is an high as 1700°C.

This information

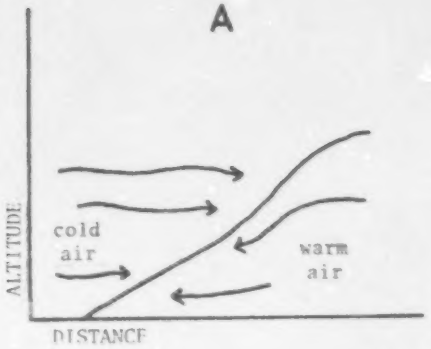
A. indicates cloud cover is responsible for changes in temperature.
B. proves that as the atmosphere becomes progressively less dense the temperature increases.
C. indicates why satellites cannot orbit above 10 km.
D. does not provide sufficient information to explain temperature changes.

D3.

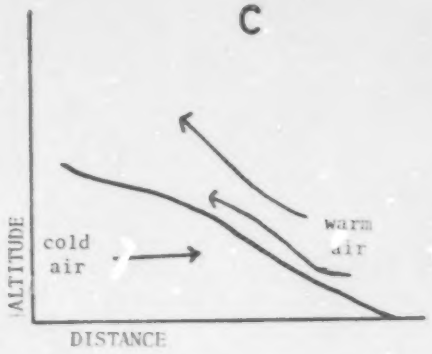
221

Which diagram correctly represents a cold front?

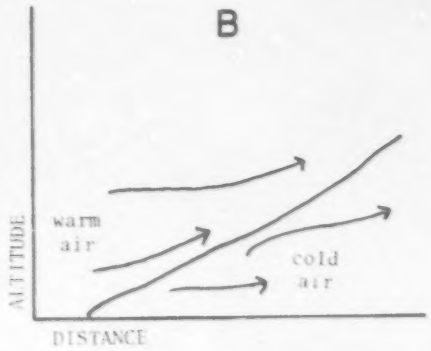
A



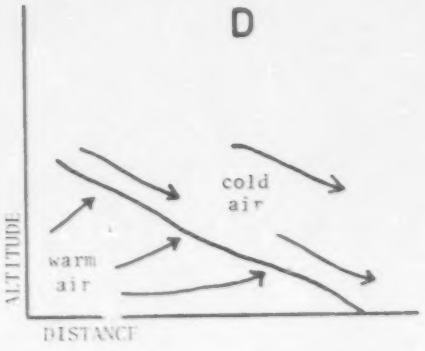
C



B



D



C3.

Which of the following is most responsible for our weather?

A. the spin of the earth.
B. water vapour in the atmosphere.
C. the sun heating the earth.
D. winds picking up and dropping moisture.

C3.

The lowest layer of the atmosphere is

A. where most modern aircraft spend most of their flight.
B. where it is too low for any clouds to exist.
C. the layer from which radio waves are reflected back to earth.
D. the most turbulent zone where most of the water vapour in the atmosphere is found.

D4.

The proportion of water vapour in the air is called

A. condensation.
B. humidity.
C. evaporation.
D. hydration.

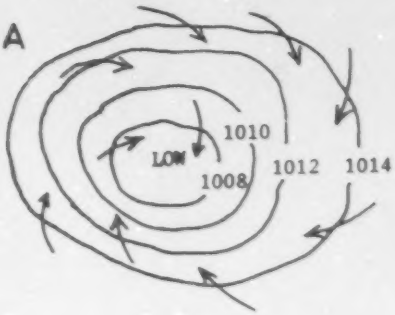
225

B3.

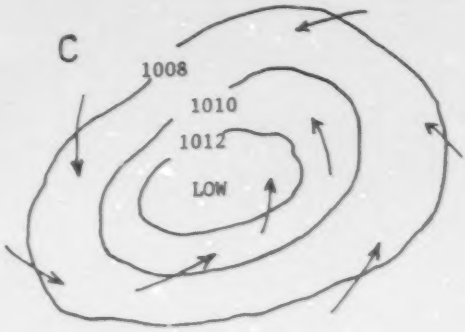
This question refers to the following information.

The diagrams below represent some atmospheric pressure systems which could appear on a weather map. The arrows represent wind direction at various points in the systems. All systems are drawn to the same scale.

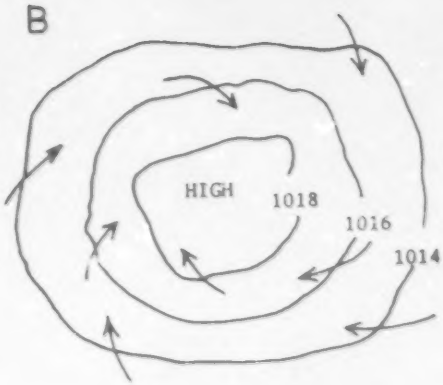
A



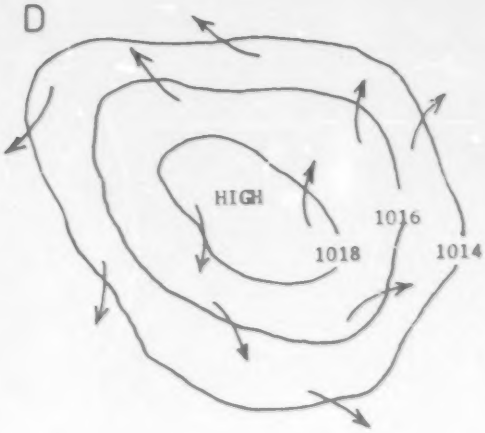
C



B



D



Which of the above diagrams (A,B,C or D) best represents a cyclone typical of the southern hemisphere?

226

B4.

An anemometer is used to measure

A. humidity.
B. rainfall.
C. wind direction.
D. wind speed.

D2

227

A measuring instrument consists of a number of cups, attached by spokes to a shaft which is free to rotate. This best describes

A. an anemometer.
B. a hydrometer.
C. an hygrometer.
D. a weather map.

A2

228

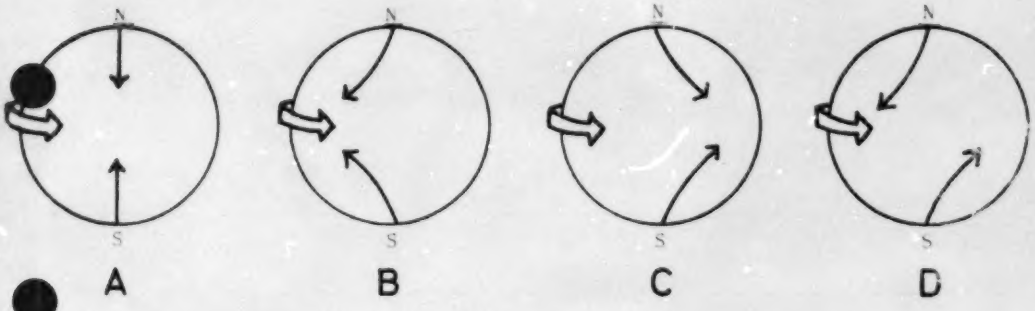
Jet streams are

A. water layers in the upper atmosphere.
B. high speed winds which travel in the upper atmosphere.
C. waves upon which weather fronts are carried.
D. vapour trails caused by aircraft.

B1

229

Which one of the following diagrams illustrates the effects of the earth's rotation on surface winds coming from the north and south poles?



P2

230

Below are a number of statements about weather. In each case, say whether the statement is true or false.

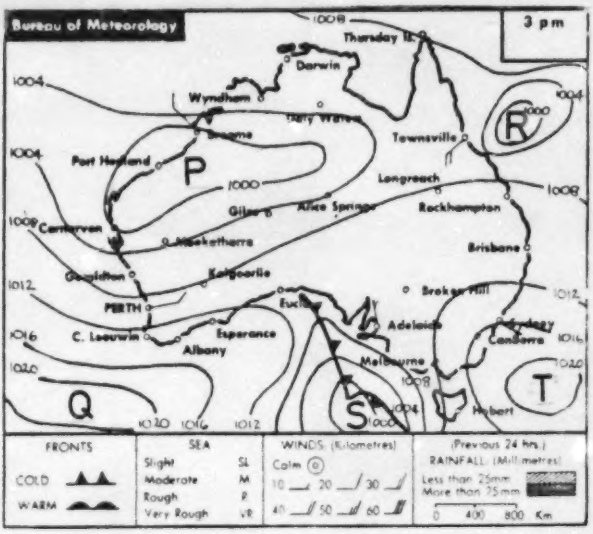
1. Warm air is less dense than cold air.
2. Air pressure decreases the higher you go.
3. An increase in air pressure occurs in an area where warm air is rising.

	Statement		
	1	2	3
A	T	F	F
B	F	T	T
C	F	T	F
D	T	T	F

D2

231

The next 7 questions refer to the weather map below.



Adelaide would be experiencing winds from which direction?

B1 A. South-east. C. North.
B. South-west. D. North-west. 232

Structures P, Q and R are correctly labelled as

	P	Q	R
A	low	low	low
B	high	low	high
C	low	high	high
D	low	high	low

D3 233

The atmospheric pressure at Townsville (in Queensland) would be closest to (in millibars)

C1 A. 1002 B. 1004 C. 1006 D. 1008 234

The wind velocity at Perth is closest to (in km/hr)

B5 A. 10 B. 20 C. 30 D. 40 235

Which structure on the map is closest to being labelled a cyclone?

B2 A. Q B. R C. S D. T 236

The following two questions refer to the weather map on the previous page.

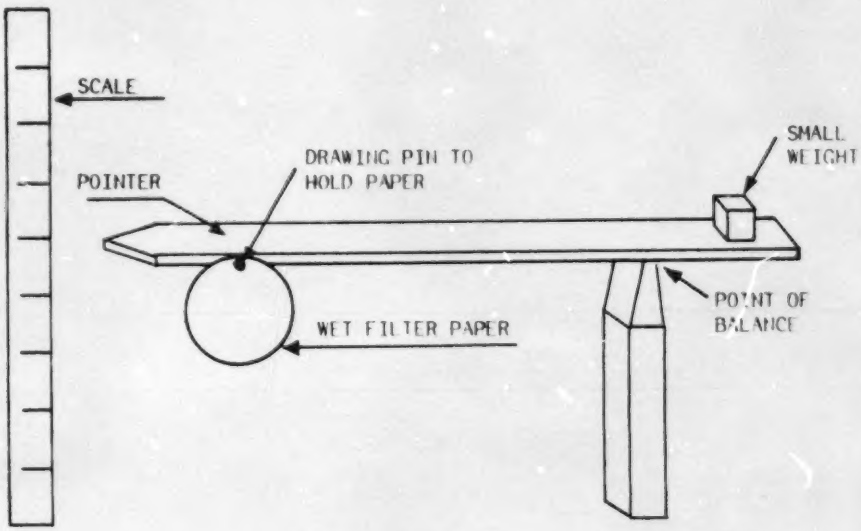
Which two places would be experiencing wind blowing from approximately the same direction?

A. Melbourne and Townsville.
B. Adelaide and Sydney.
C. Thursday Islands and Alice Springs.
B3 D. Wyndham and Hobart. 237

The immediate forecast for Sydney would be closest to

A. westerly winds with afternoon thunderstorms.
B. continuing fine and sunny, easterly sea breezes.
C. cool snap expected with southerly winds. Chance of rain.
B2 D. hot westerly winds contracting south. Continuing sunny weather. 238

Here is a drawing of an instrument that detects changes in the weather.

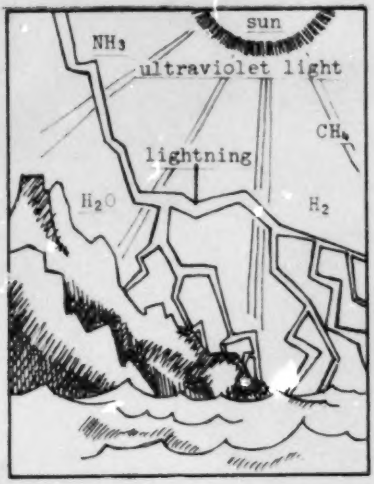


On hot, dry days the pointer rises very soon after the instrument is set up. On cold, damp days it takes a long time to rise.

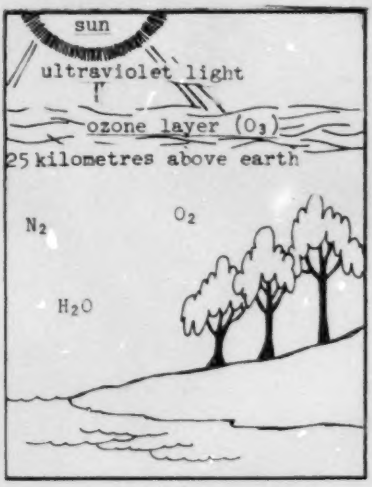
Which of the following statements is the best explanation for the movement of the pointer?

A. Hot, dry air rises and pushes up the pointer.
B. The expansion of the filter paper on dry, hot days makes the pointer rise.
C. Evaporation of water from the filter paper makes it weigh less on hot dry days than on cold wet days.
C4 D. The filter paper contracts on cold, damp days and this keeps the pointer steady. 239

The next question refers to the following information.



At one stage the Earth's atmosphere made it impossible for life to survive.



Today, the atmosphere is very different. A layer of ozone filters the ultraviolet light and oxygen is now present.

The ozone layer is important today because it

A. provides the atmosphere with nitrogen (N_2).
B. provides the atmosphere with oxygen (O_2).
C. stops ulta-violet light reaching the earth.
C3 D. stops lightning striking. 240

If you wanted to establish a weather station in your back garden, which of the following groups of instruments would you choose?

A. Anemometer, balloons, theodolite.
B. Barometer, thermometer, rain gauge.
C. Force measurer, hygrometer, hydrograph.
B4 D. Wet and dry bulb thermometer, wind vane, calculator. 241

Which choice correctly matches all three measuring instruments with the quantity to be measured?

	Wind Velocity	Pressure	Humidity
A	Barometer	Hygrometer	Thermometer
B	Weather Vane	Anemometer	Barometer
C	Anemometer	Barometer	Hygrometer
D	Hygrometer	Thermometer	Rain gauge

242

A meteorological balloon is filled with hydrogen and then released. As the balloon rises the pressure of the

A. air remains constant.
B. hydrogen increases.
C. hydrogen remains constant.
D3 D. outside air decreases. 243

Humidity is

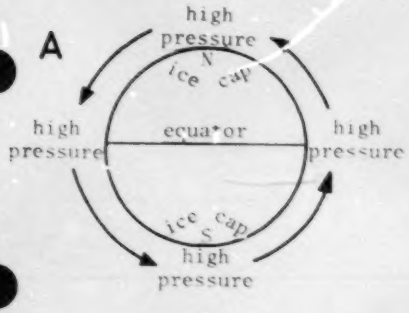
A. the measure of wind speed.
B. the amount of moisture in the air.
C. an estimate of the percentage of cloud cover.
B5 D. expressed by lines on a weather map. 244

When air has a high humidity, it

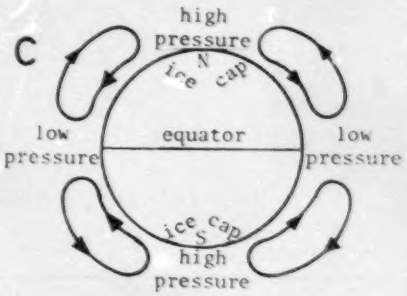
A. contains very little water.
B. contains a high proportion of humus.
C. contains a lot of moisture.
C D. has a high temperature. 245

The diagram which best shows global air circulation is

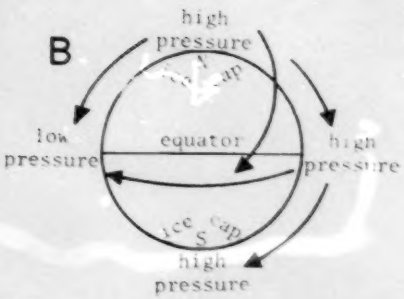
A



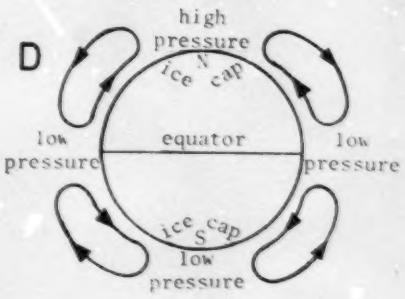
C



B



D

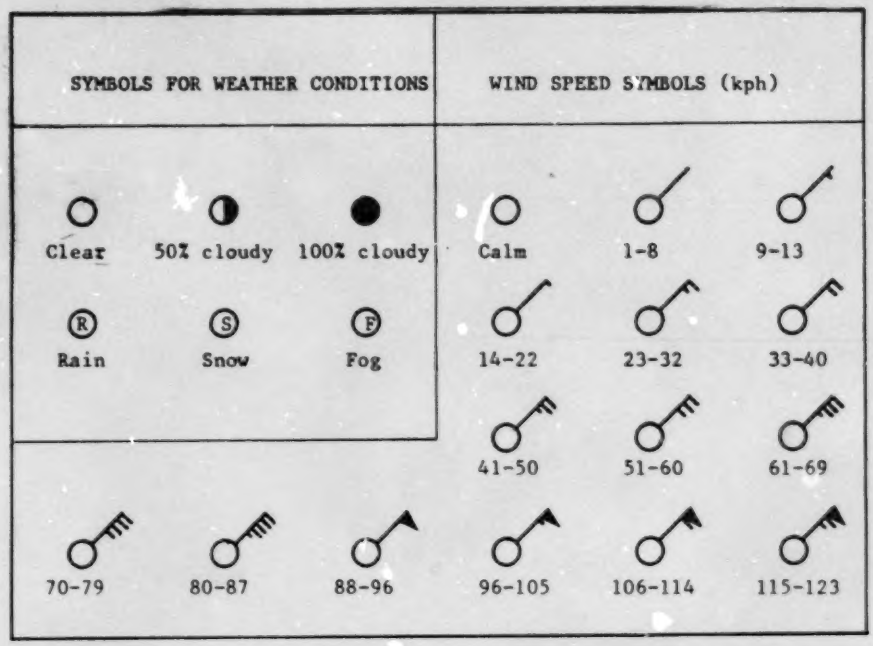


C 246

The temperature at which water vapour begins to condense onto the earth's surface is called the

A. condensation point.
B. melting point.
C. vaporising point.
D1 D. dew point. 247

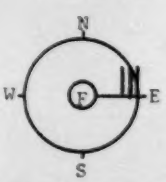
The next three questions refer to the diagrams below.



Which weather symbol below could best be read as saying "wind from the west at 50kph, clear skies, some fog expected"?

A.

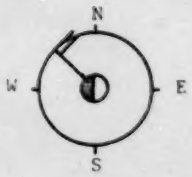
C.

D. 

C3.

248

The symbol on the right forecasts which weather below?



A. Winds from the south-east at 35kph, cloudy skies.
B. North-west winds at 35kph, skies half covered by cloud.
C. 25kph winds from the north-west, 50% cloud cover.
D. North-easterly winds at 40kph, 50% cloud cover.

B3.

249

Which forecasts symbol would have the strongest winds.

A.

B.

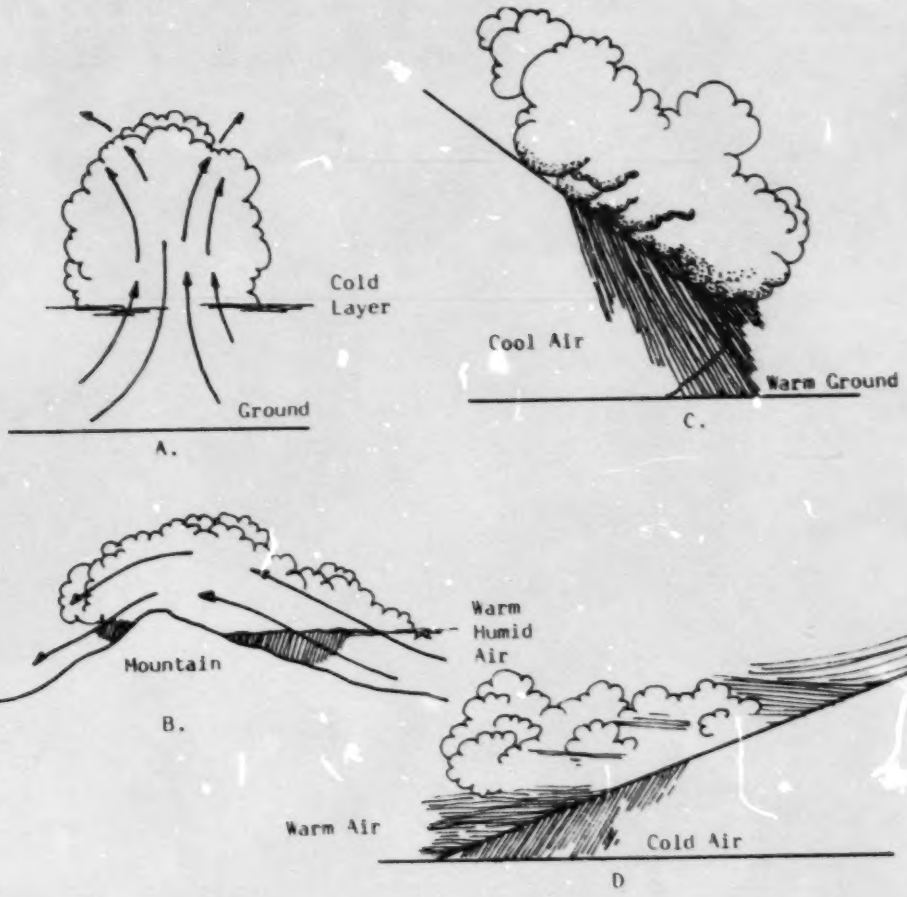
C

D.

D3.

250

The next question refers to the diagram below.

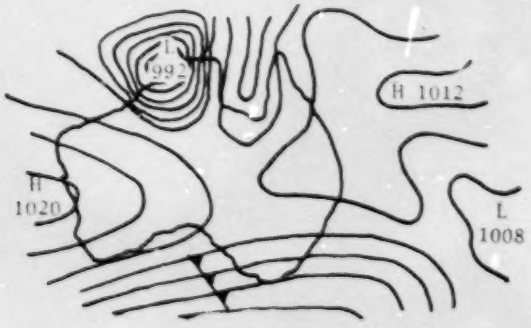


A cool change is often accompanied by the development of clouds and thunderstorms. Which of the pictures above represents the cold front?

C1

251

Observe the following weather map.



From the above map, the best prediction about the weather conditions at Darwin at that time would be

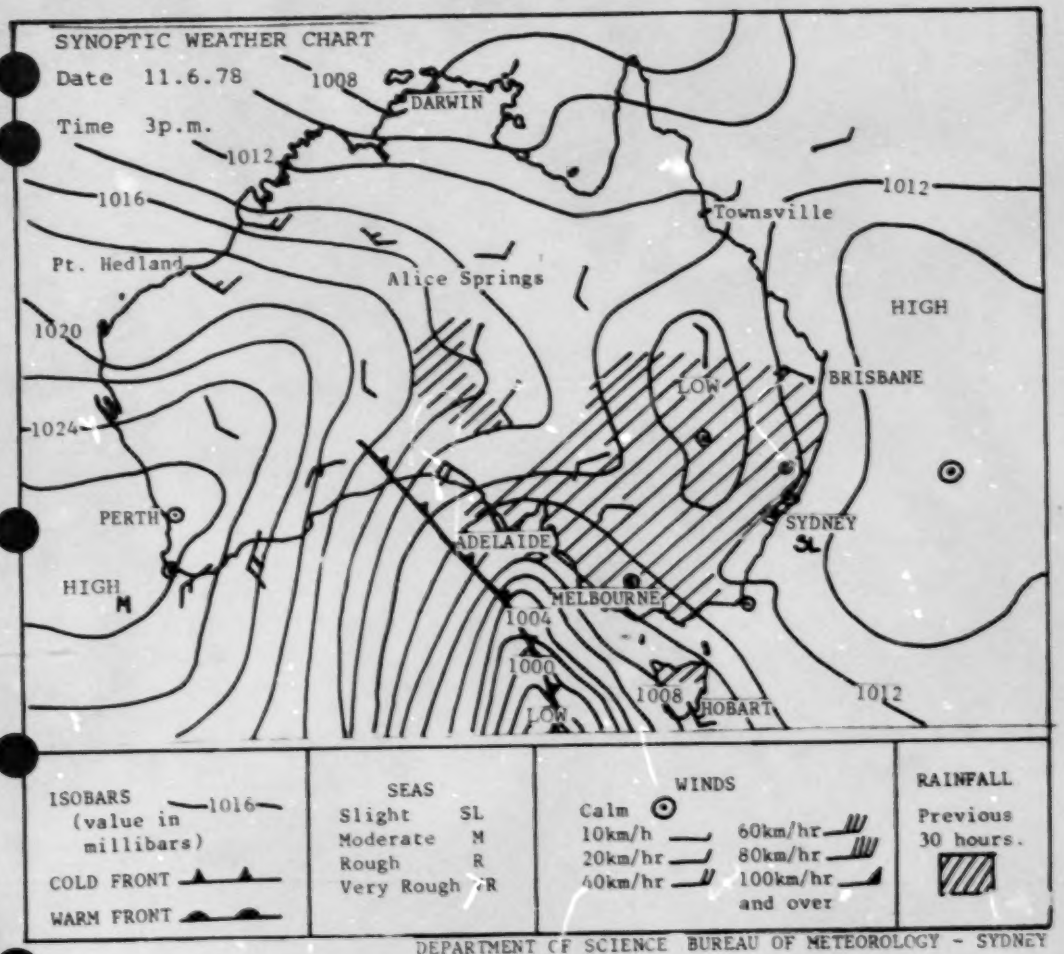
A. fine, clear and warm with no winds.
B. overcast and rainy with winds from the east.
C. fine and clear with strong winds from the south east.
D. cyclonic conditions with strong winds from the north.

103

D3

252

The next three questions refer to the following weather map.



The weather map shows a number of lines called isobars. These lines join places which have the same

A. air pressure at the same time.
B. air temperature at the same time.
C. rainfall at the same time.

A5 D. wind speed at the same time. 253

From which direction is the wind blowing in Perth?

A. South. C. North-east.

B3 B. South-west. D. West. 254

One of the following was the actual forecast for Sydney, issued by the Bureau of Meteorology at 3p.m. on the 11th of June, 1978. Study the map and decide which forecast the Bureau issued.

A. Fine, warm and mostly sunny with freshening northerly winds.

B. Mild at first, becoming cooler during the day with winds turning northerly. Humid with rain increasing and possible thunderstorms.

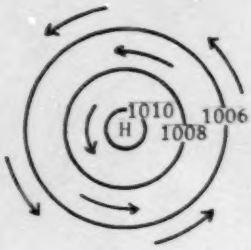
C. Cool. North-west winds freshening. Gusty south-westerly change to follow late in the day.

B3 D. Fine and mild with light winds and afternoon sea breezes. 255

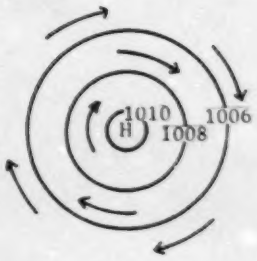
102

Which diagram correctly represents an anticyclone in the southern hemisphere?

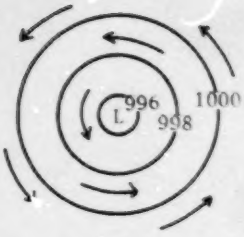
A



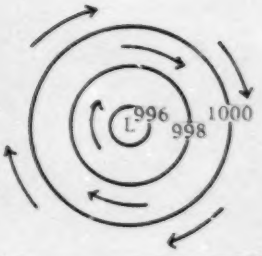
C



B



D



A1

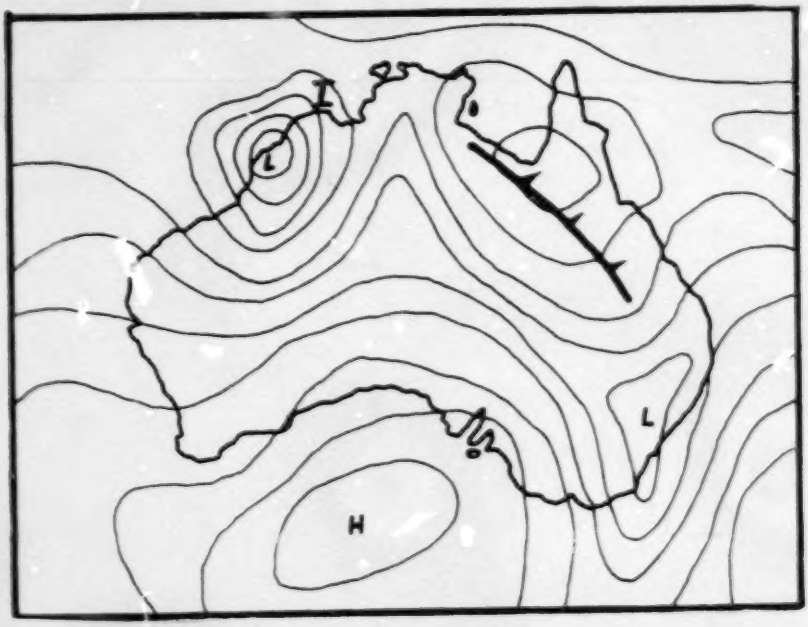
256

A cyclone blowing towards Darwin would be a

A. high pressure area, winds blowing clockwise.
B. high pressure area, winds blowing anticlockwise.
C. low pressure area, winds blowing clockwise.
C1 D. low pressure area, winds blowing anticlockwise.

257

The next question refers to the diagram below.



The weather in the vicinity of (I) would probably be

A. cool, calm and dry.
D4 B. hot, calm and wet.
C. warm, windy and wet.
D. cool, windy and dry.

258